On BigPipe
On Node.js

by @undoZen

What I'll talk today

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- on BigPipe - What's it?

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- on "BigPipe on Node" - How to implement it?

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- on BigPipe - What's it?
- on "BigPipe on Node" - How to implement it?
- on Node - Share some personal thoughts on node.

On BigPipe

What’s BigPipe

What’s BigPipe

- It’s a technique invented by Facebook to improve web page loading performance

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- Server

What’s BigPipe

- It’s a technique invented by Facebook to improve web page loading performance
- Server
  - Transfer document using chunked encoding

Chunked Encoding

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  - Size of HTTP body transfered before it

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- In HTTP/1.0 Content-Length header is required
  - Size of HTTP body transfered before it
- In HTTP/1.1 you have Transfer-Encoding: chunked
  - a chunk include a piece of response data and it's length before it
  - an empty chunk indicate the end of transferring

Content-Length vs Chunked Encoding

```
var http = require('http');
http.createServer(function (req, res) {
  var msg = '<!doctype html><h1>Hello</h1><h2>World</h2>';
  res.setHeader('Content-Type', 'text/html');
  res.setHeader('Content-Length', Buffer.byteLength(msg));
  res.end(msg);
}).listen(1234);
```

```
var http = require('http');
http.createServer(function (req, res) {
  res.setHeader('Content-Type', 'text/html');
  res.write('<!doctype html>');
  res.write('<h1>Hello</h1>');
  res.write('<h2>World</h2>');
  res.end();
}).listen(1234);
```

```
3. telnet (40,16)
~ - @undozen
$ telnet 127.0.0.1 1234
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.
GET / HTTP/1.1
Host: localhost

HTTP/1.1 200 OK
Content-Type: text/html
Content-Length: 43
Date: Fri, 08 Nov 2013 15:36:08 GMT
Connection: keep-alive

<!doctype html><h1>Hello</h1><h2>World</
h2>
```

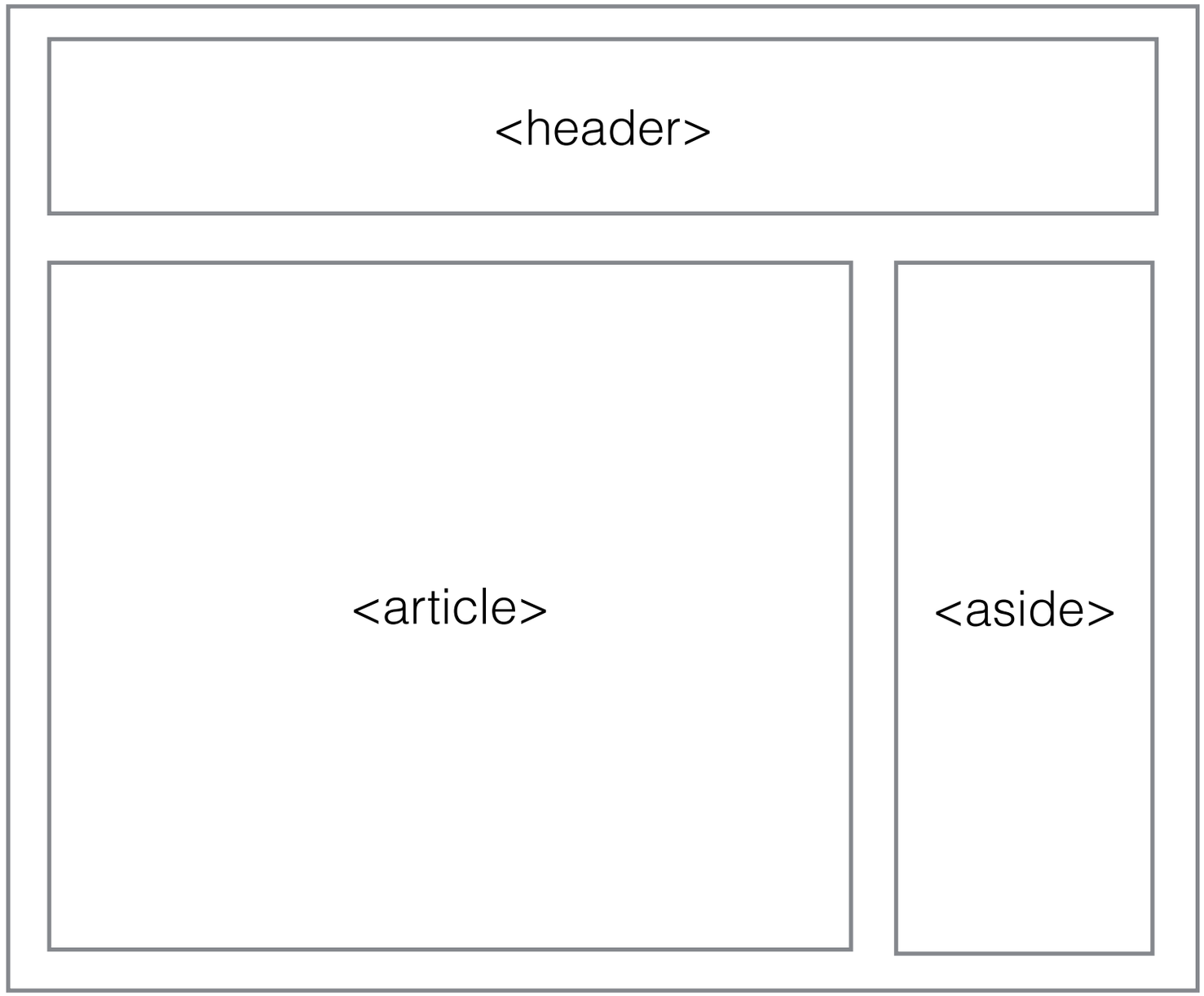
```
3.
~ - @undozen
$ telnet 127.0.0.1 1234
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.
GET / HTTP/1.1
Host: localhost

HTTP/1.1 200 OK
Content-Type: text/html
Date: Fri, 08 Nov 2013 02:02:04 GMT
Connection: keep-alive
Transfer-Encoding: chunked

f
<!doctype html>
e
<h1>Hello</h1>
e
<h2>World</h2>
0
```

Go on …

Here’s a simple web page…



… and it’s simple HTML

```
<!doctype html>
<html>
…
<body>

  <header>
    {{header_content}}
  </header>

  <article>
   {{article_content}}
  </article>

  <aside>
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  </aside>

<footer>…</footer>
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  - How we transfer it using chunked encoding?

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- Answer:
  - Send it chunk by chunk.

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… and it’s simple HTML

Chunk #1

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<body>
```

#2

```
<header>
  {{header_content}}
</header>
```

#3

```
<article>
 {{article_content}}
</article>
```

#4

```
<aside>
  {{aside_content}}
</aside>
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#5

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<footer>…</footer>
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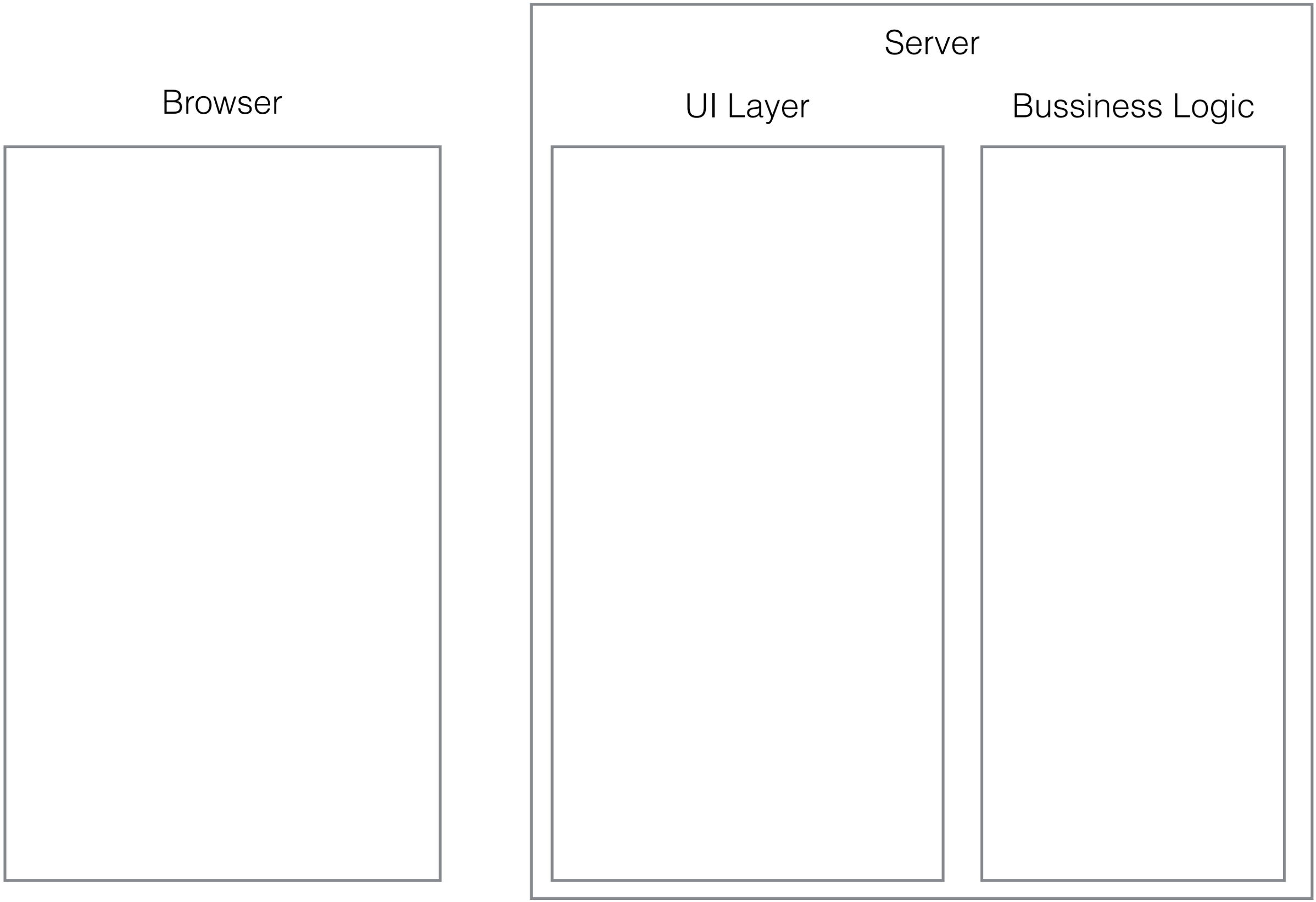

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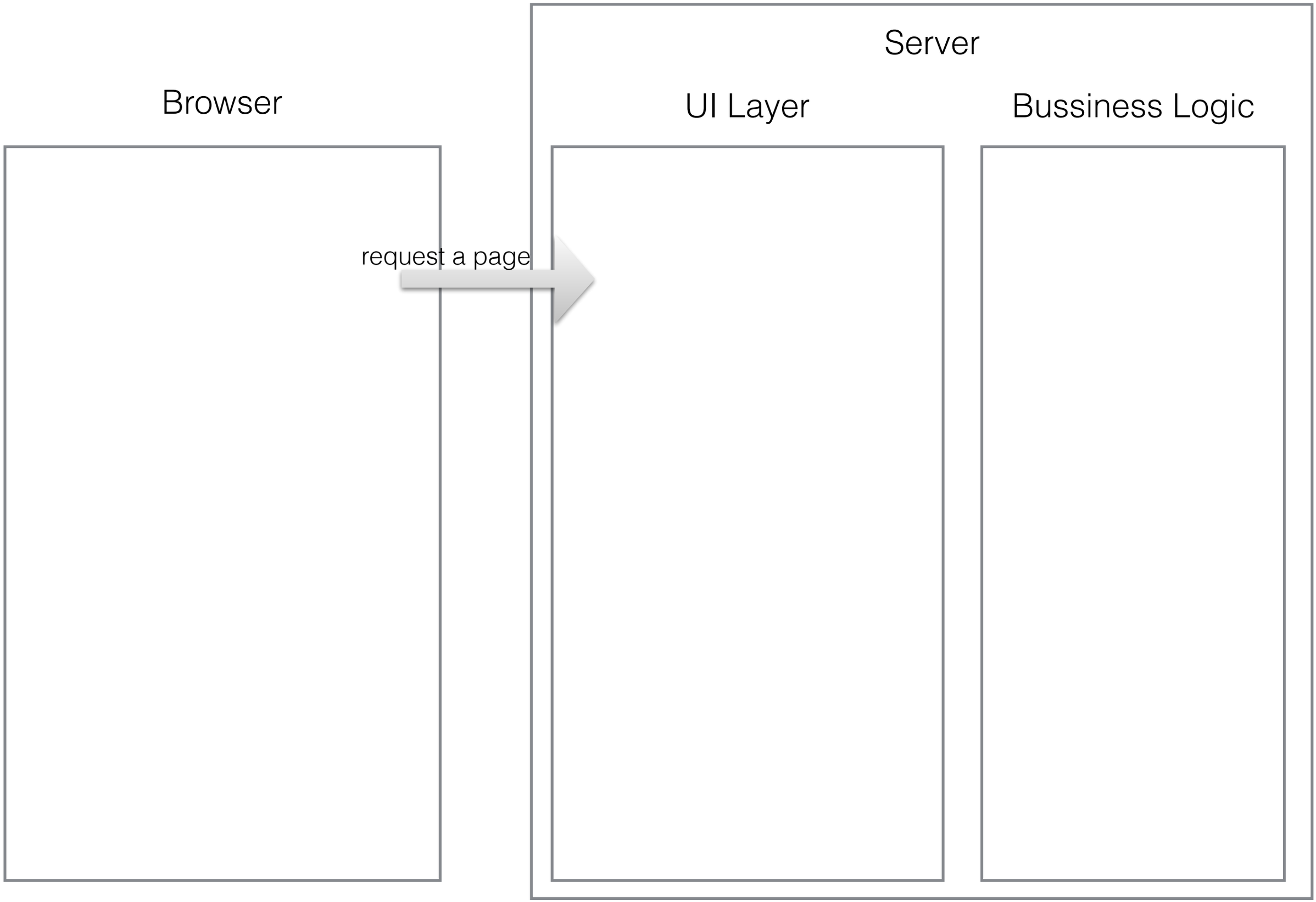

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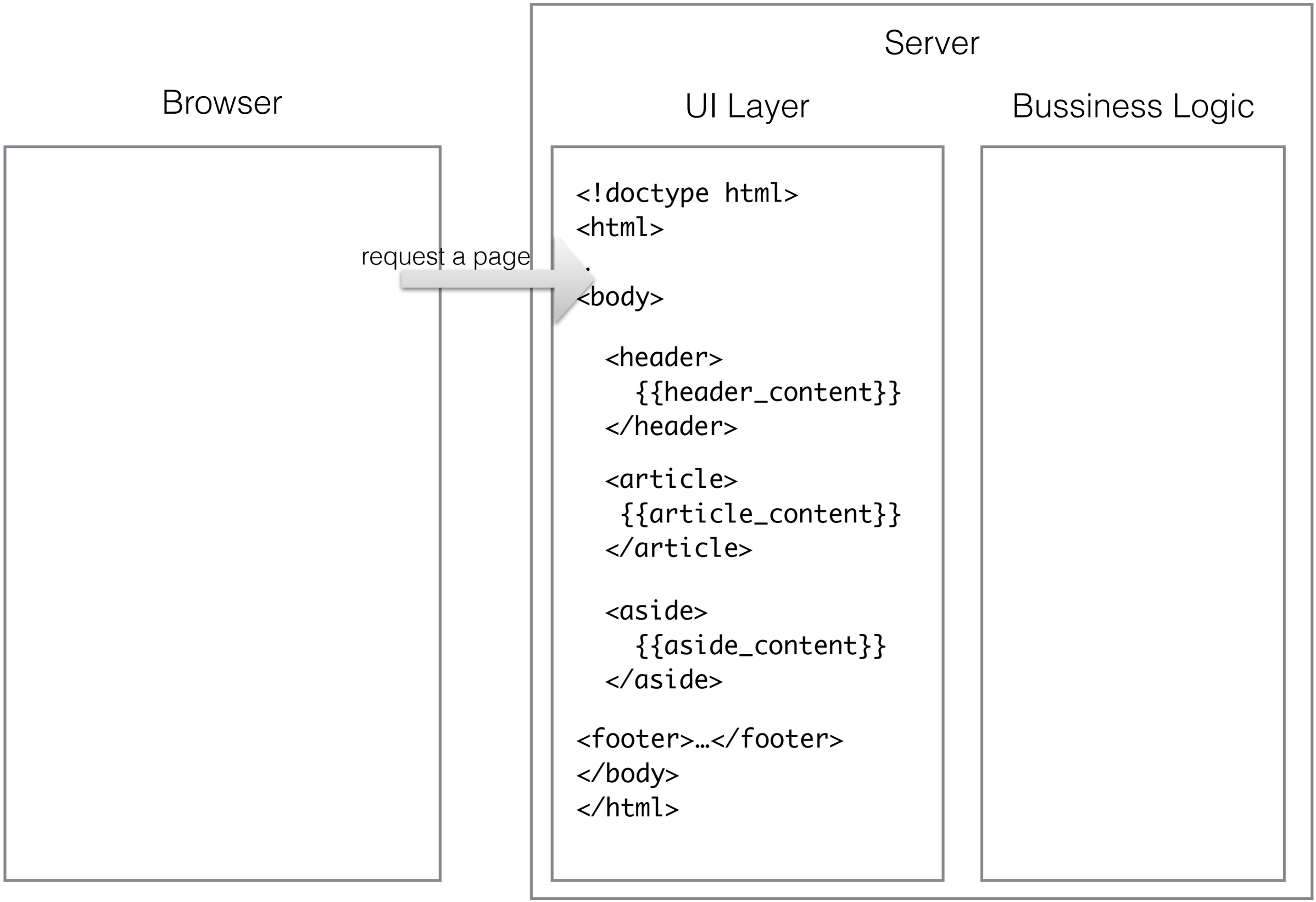

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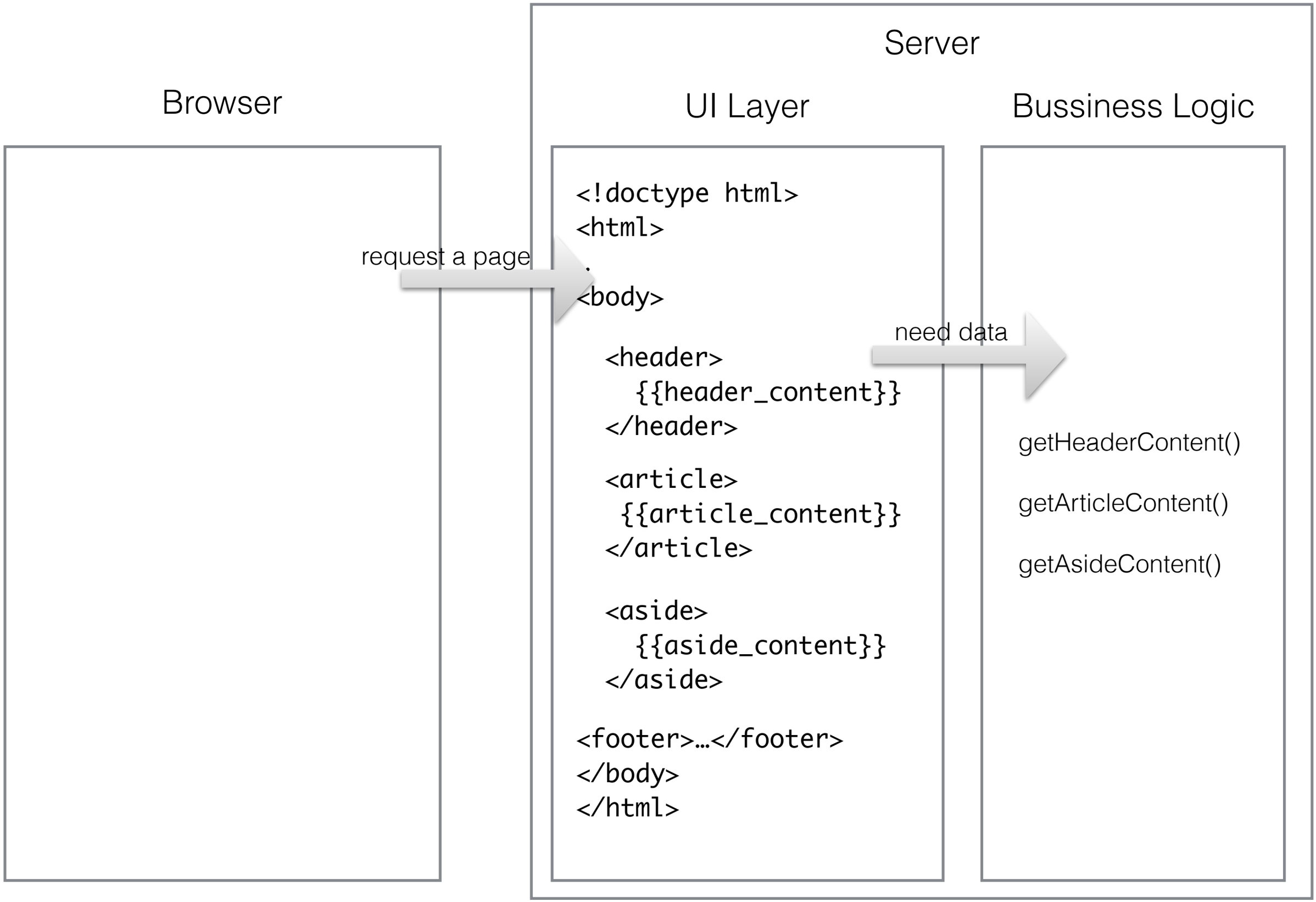

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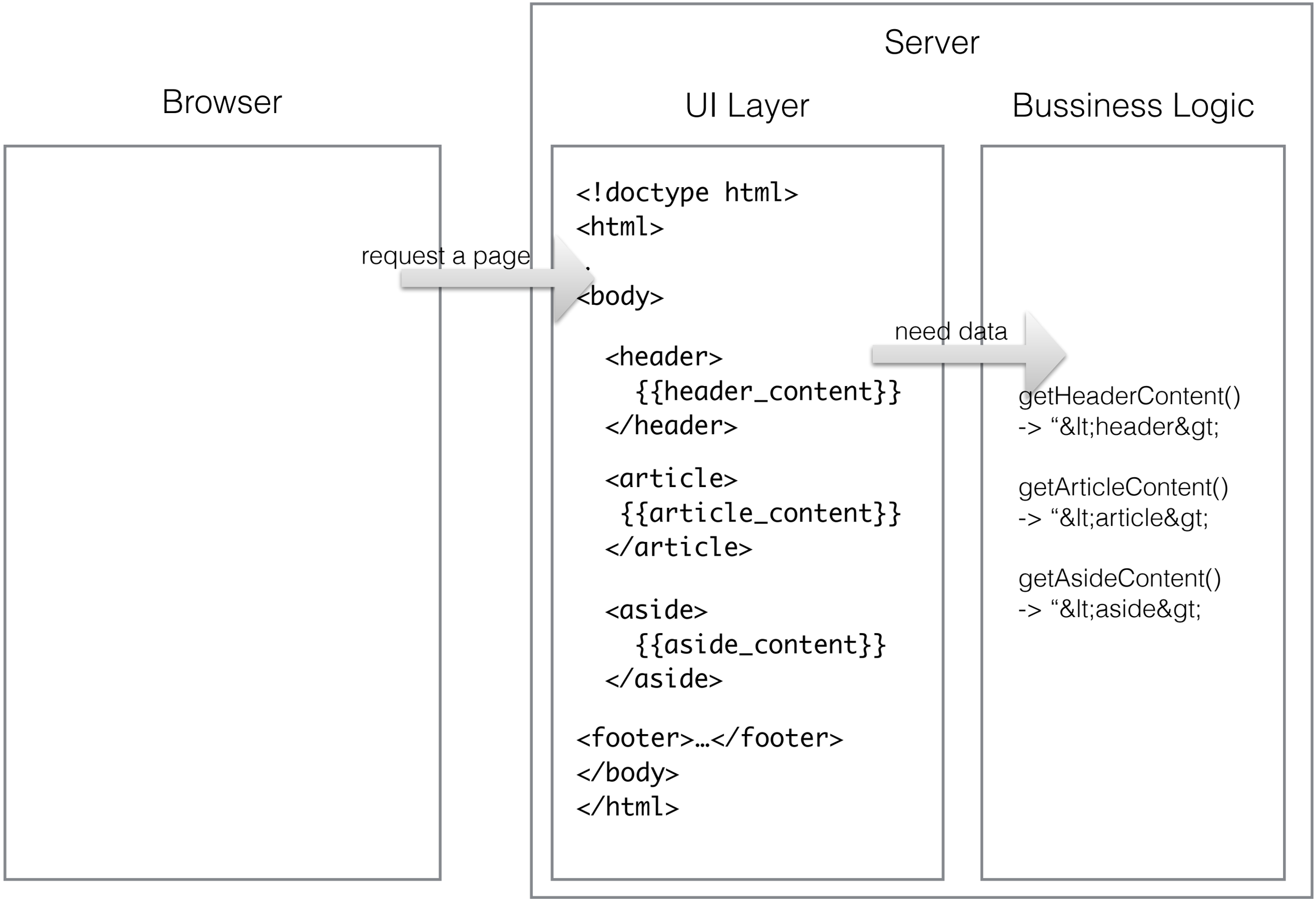

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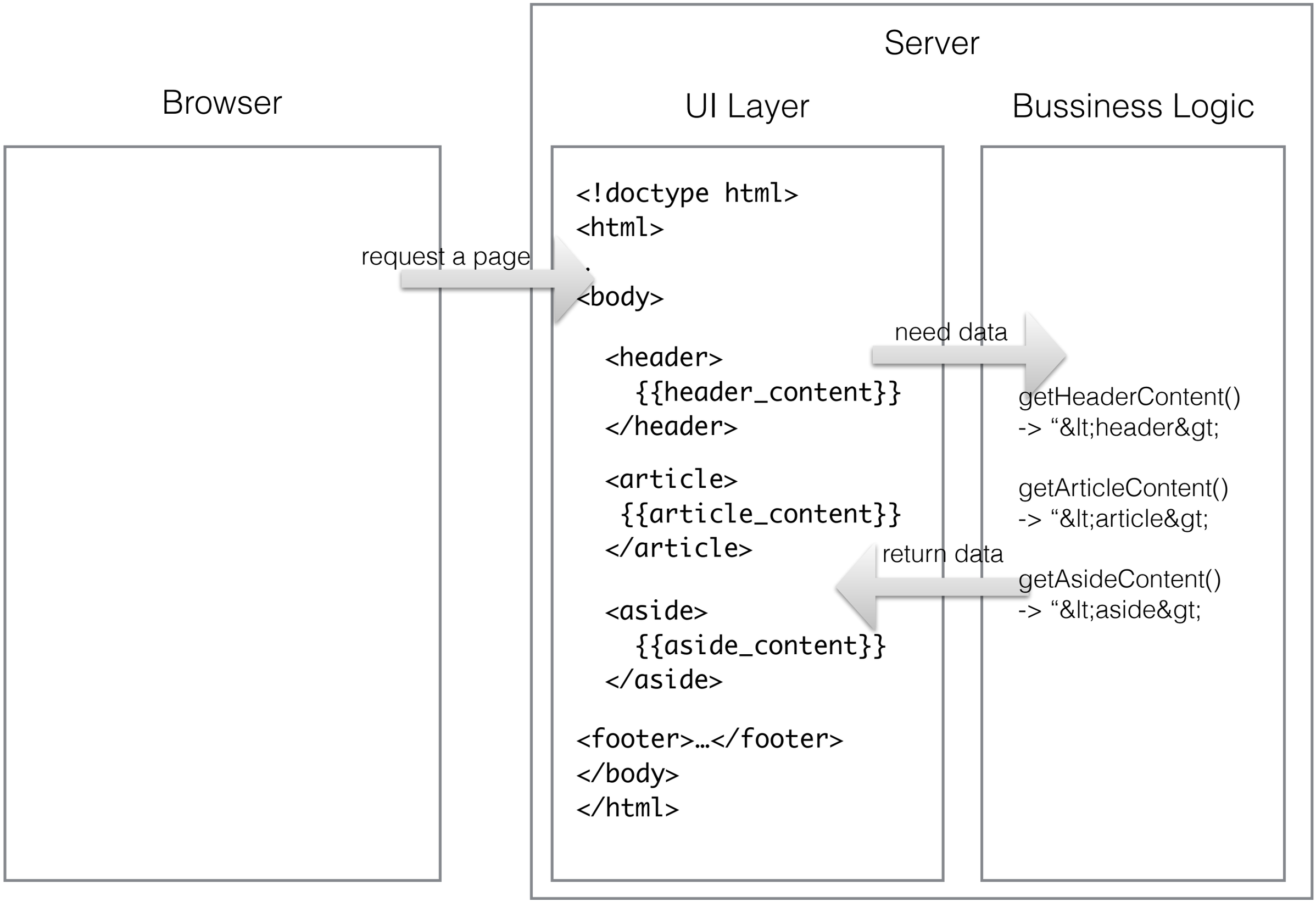

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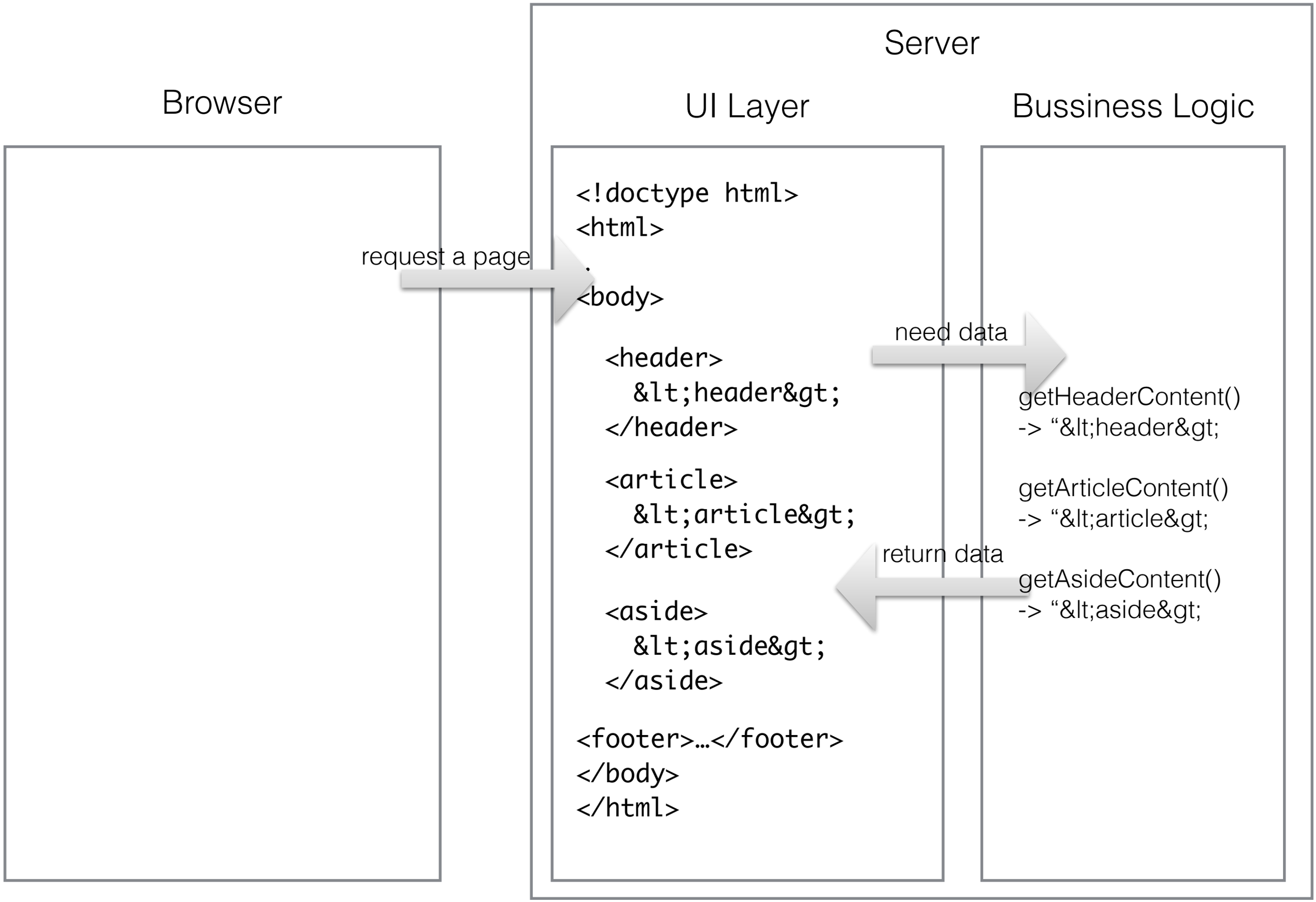

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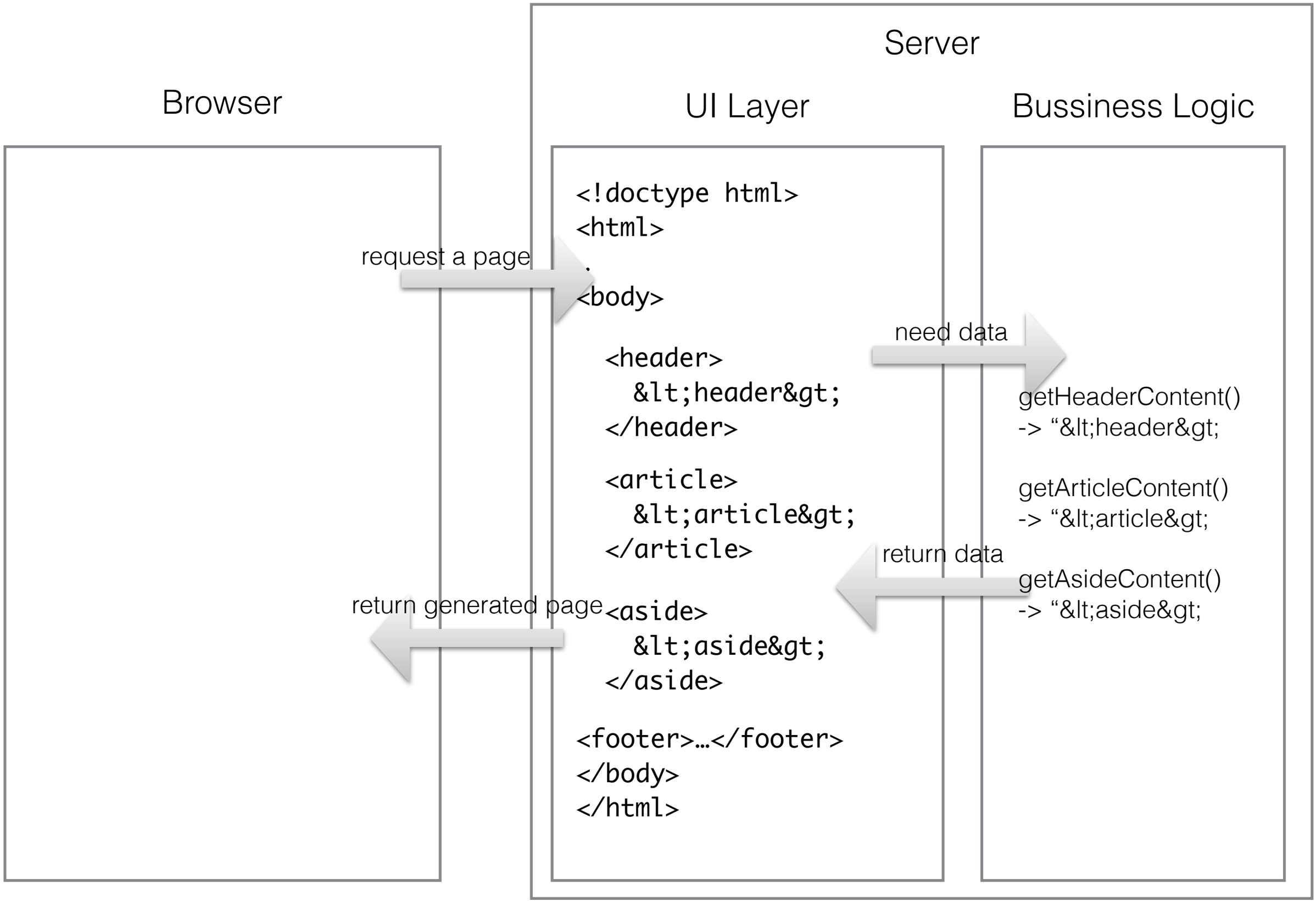

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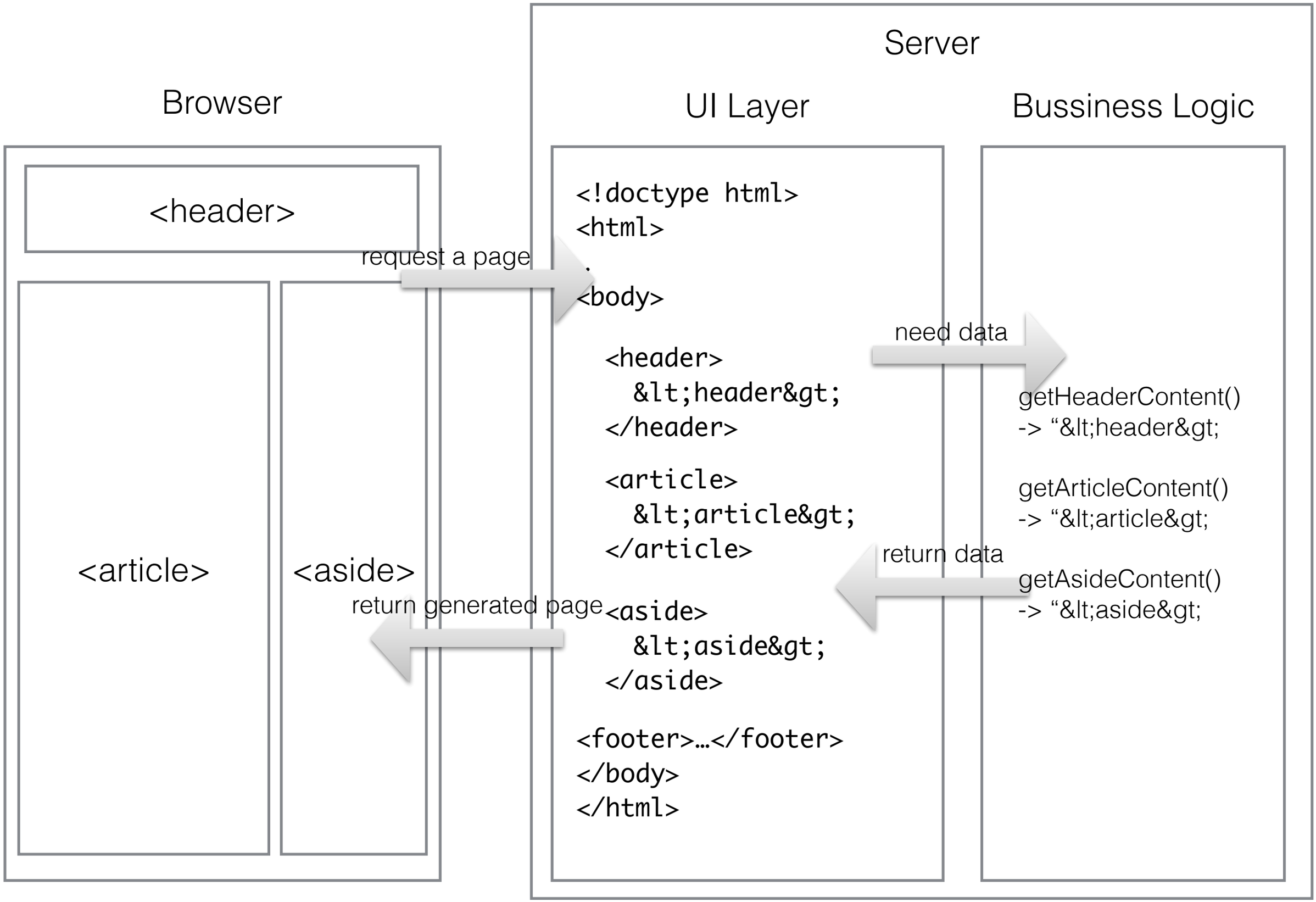

Simplify the generating process

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- Server assemble the data and template, generate entire HTML document to send to the browser

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- Bussiness Logic has data, UI Layer has template
- Server assemble the data and template, generate entire HTML document to send to the browser
- Browser receive the document, then parse and render it

Zoom In Bussiness Logic Part…

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- Assume that in the bussiness logic
  - getHeaderContent() taks 500ms
  - getArticleContent() takes 100ms
  - getAsideContent() takes 300ms

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  - getArticleContent() takes 100ms
  - getAsideContent() takes 300ms
- We need to wait for getHeaderContent() to finish

Zoom In Bussiness Logic Part…

- Assume that in the bussiness logic
  - getHeaderContent() taks 500ms
  - getArticleContent() takes 100ms
  - getAsideContent() takes 300ms
- We need to wait for getHeaderContent() to finish
- Because we don’t want HTML source messed

Like this…

Like this…

```
<!doctype html>
<html>
…
<body>
```

Like this…

```
<!doctype html>
<html>
…
<body>
  <article>
    &lt;article&gt;
  </article>
```

100ms data

Like this…

```
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…
<body>
  <article>  100ms data
    &lt;article&gt;
  </article>
  <aside>  300ms data
    &lt;aside&gt;
  </aside>
```

Like this…

```
<!doctype html>
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  <article>  100ms data
    &lt;article&gt;
  </article>

  <aside>  300ms data
    &lt;aside&gt;
  </aside>

  <header>  500ms data
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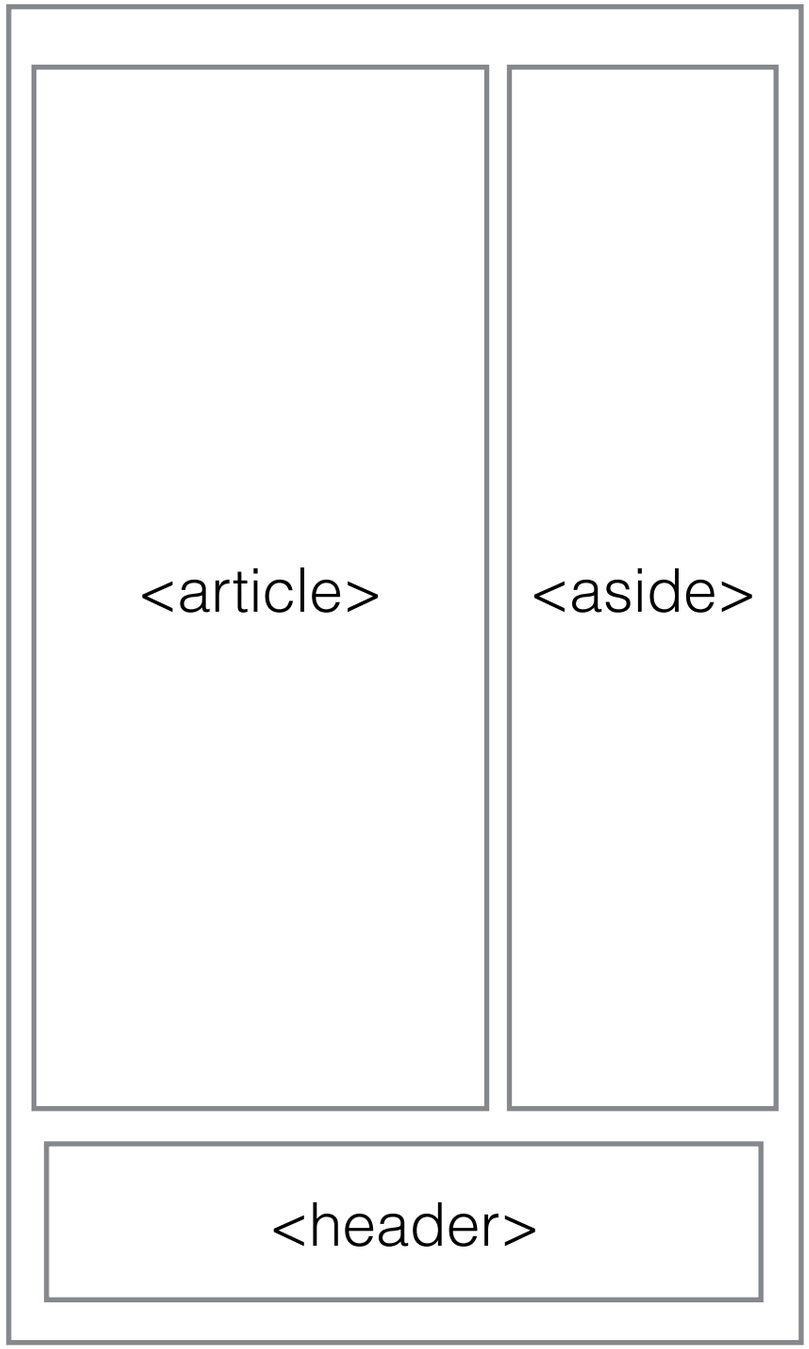
So we will get this in browser



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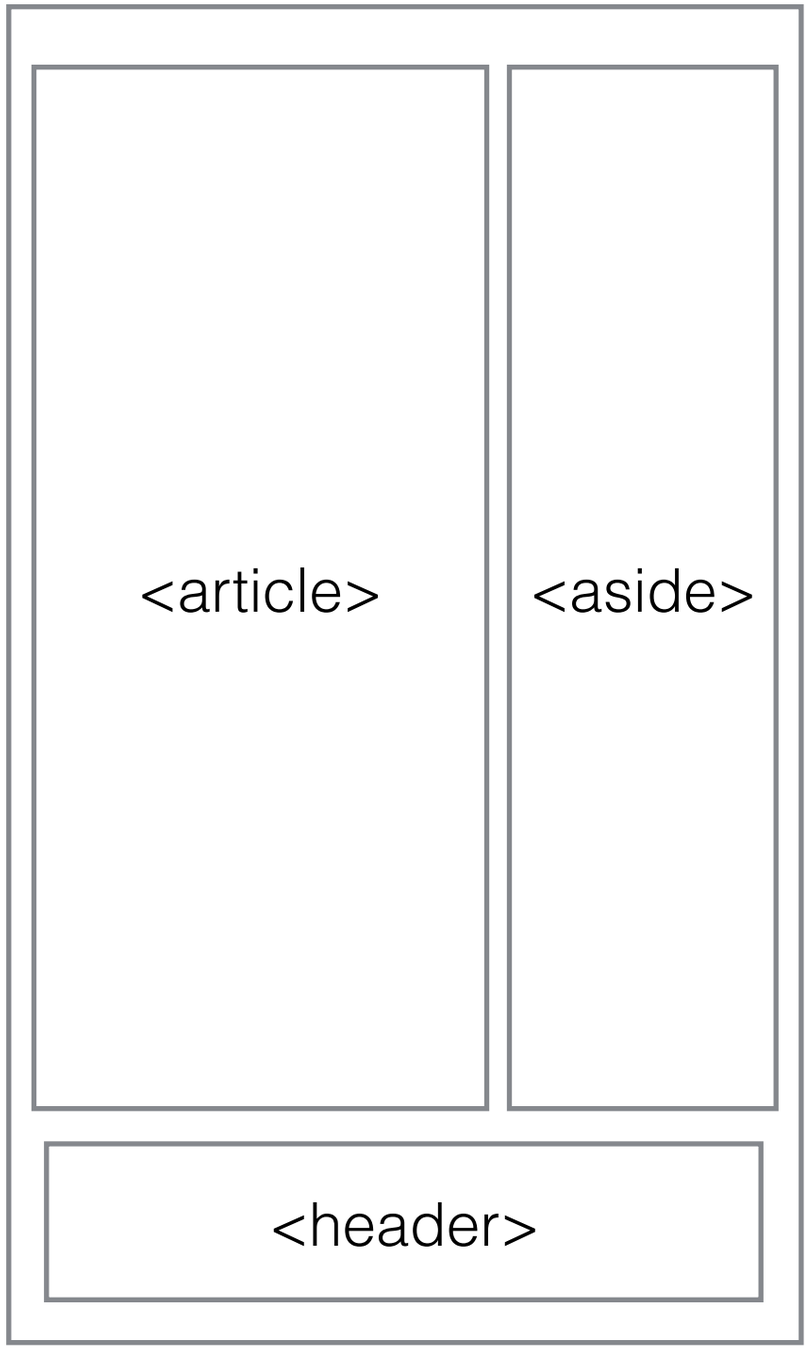

- So in this way chunked encoding doesn't meaning much to us.

Like this…

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<html>
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    &lt;article&gt;
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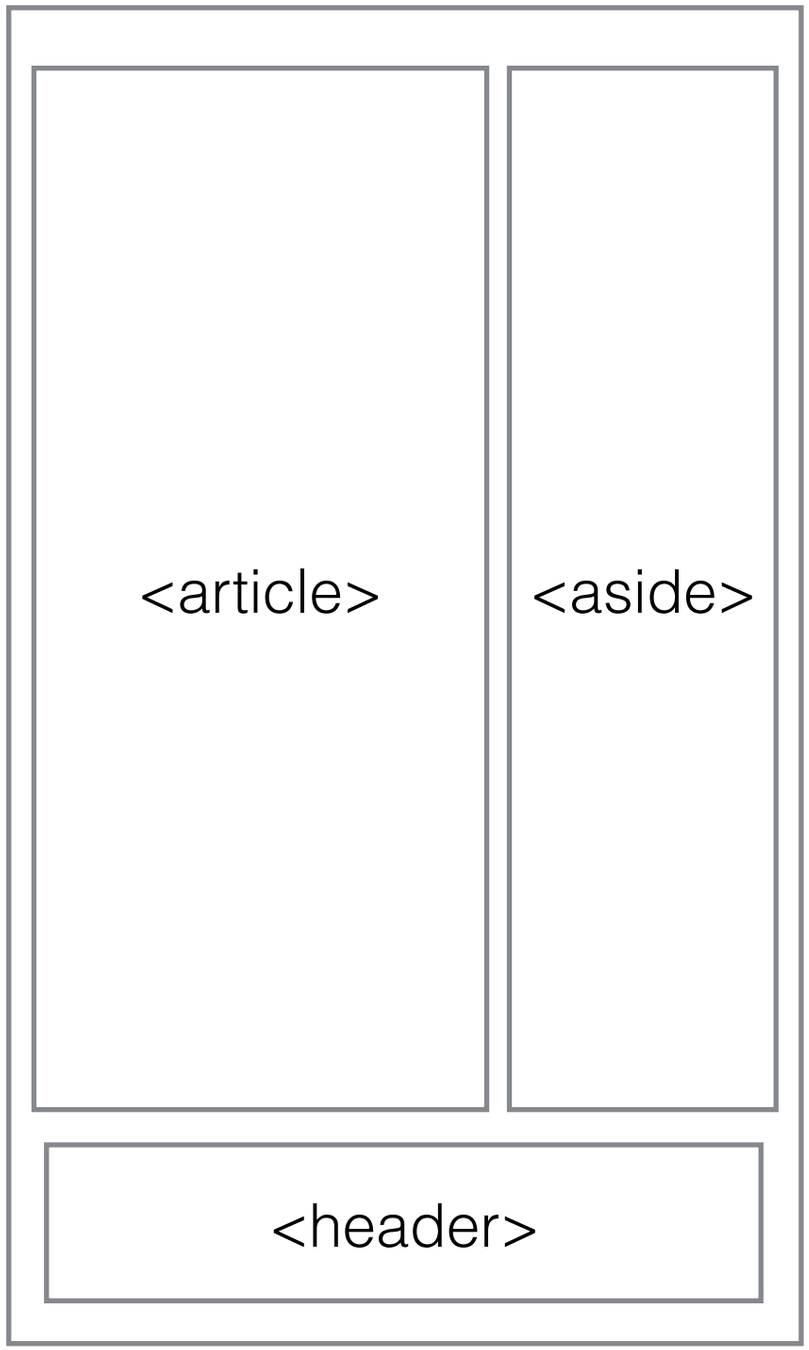

- So in this way chunked encoding doesn't meaning much to us.
- Because the order matters.

What’s BigPipe

- It’s a technique invented by Facebook to improve web page loading performance.
- Server
  - Transfer document using chunked encoding
  - Transferring order of chunked data doesn’t matter

How?

We have to question that…

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- Does HTML really need to be assembled in server-side?

We have to question that…

- Does HTML really need to be assembled in server-side?
- Of Course Not!

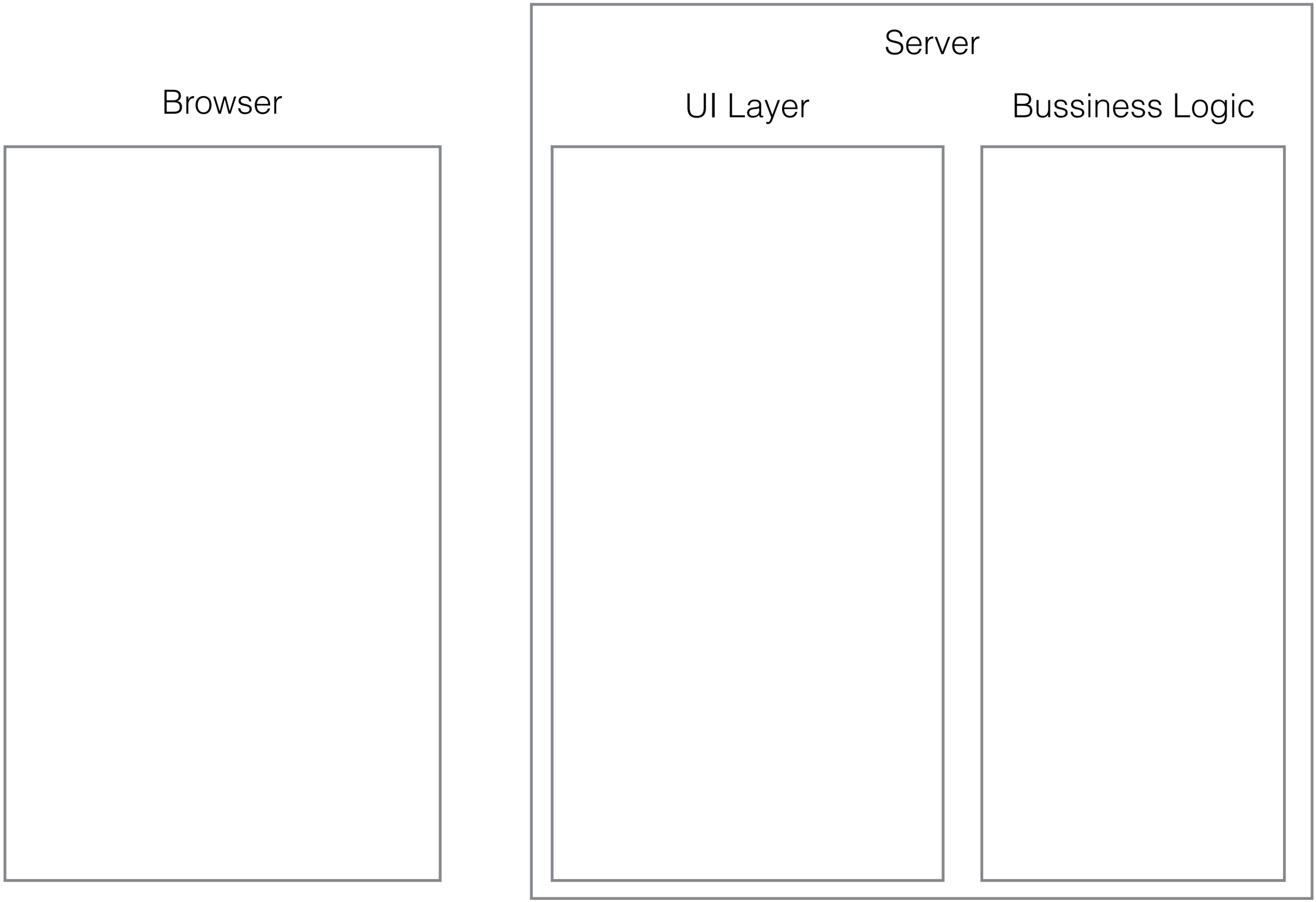
We have to question that…

- Does HTML really need to be assembled in server-side?
- Of Course Not!
- There’s client-side templating everywhere now

What’s BigPipe

- It’s a technique invented by Facebook to improve page loading performance.
- Server
  - Transfer document using chunked encoding
  - Chunked data transferring order doesn’t matter
- Browser
  - Initialize web page using JavaScript

So Here's the BigPipe Way of Page Initialization



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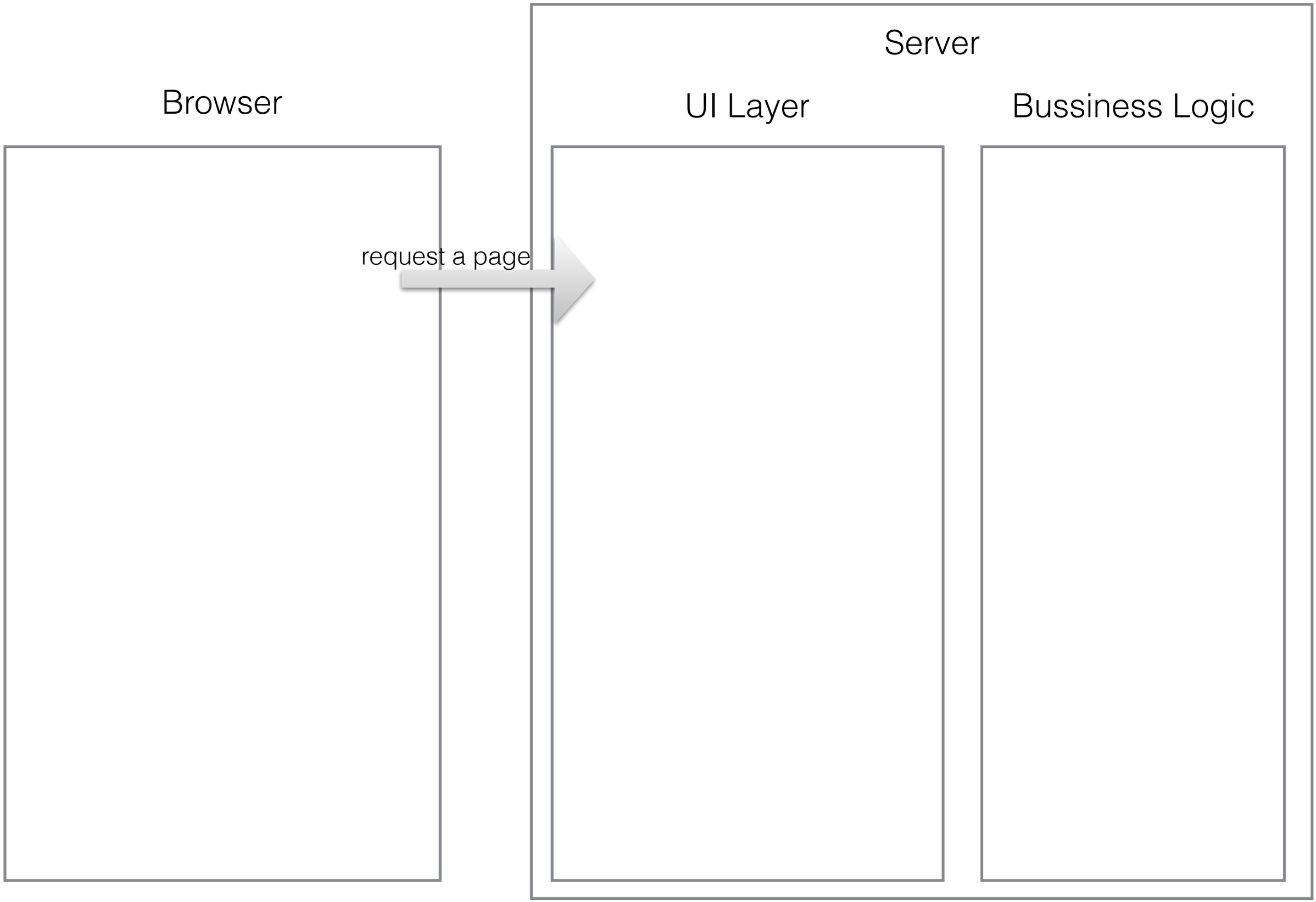

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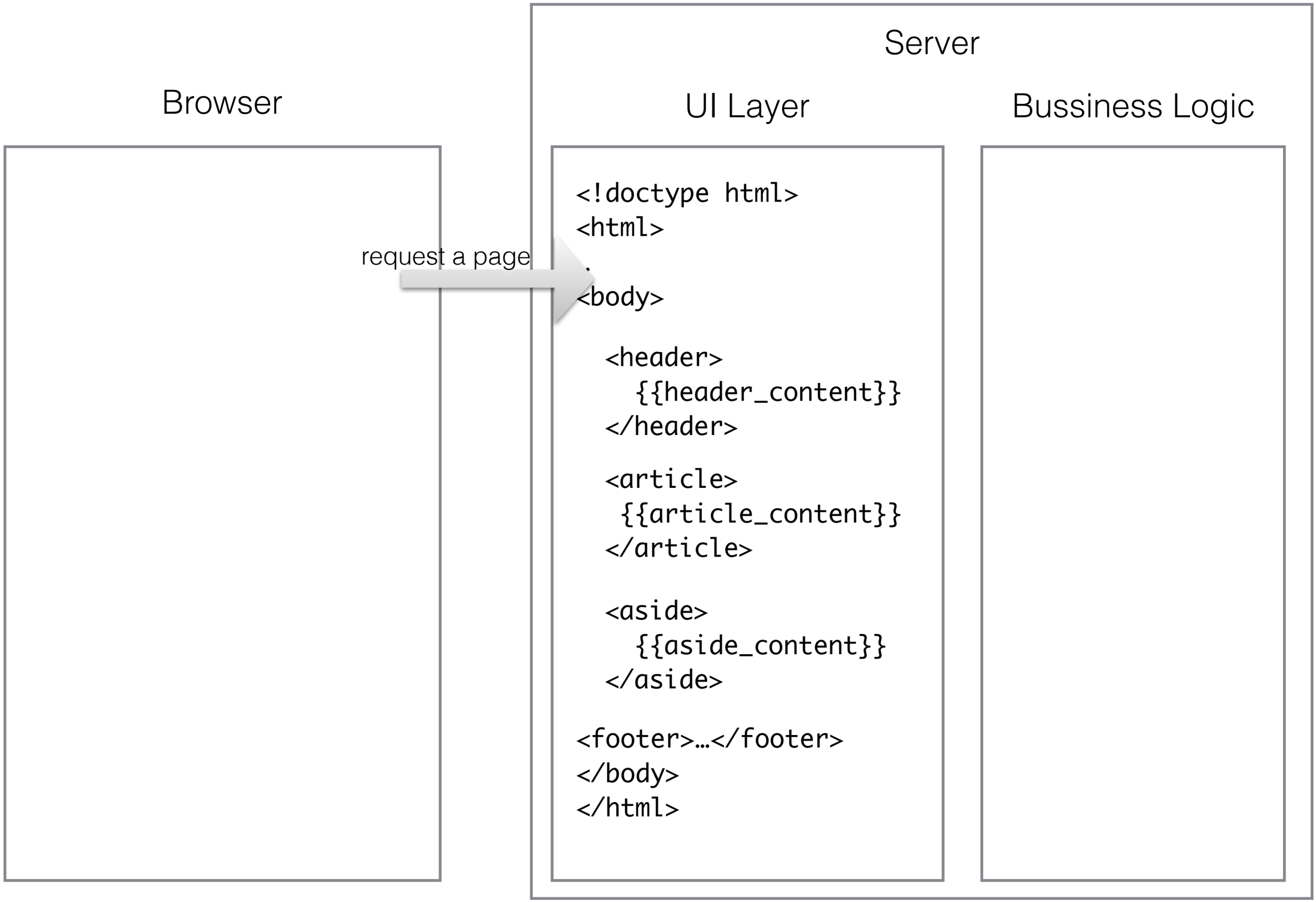

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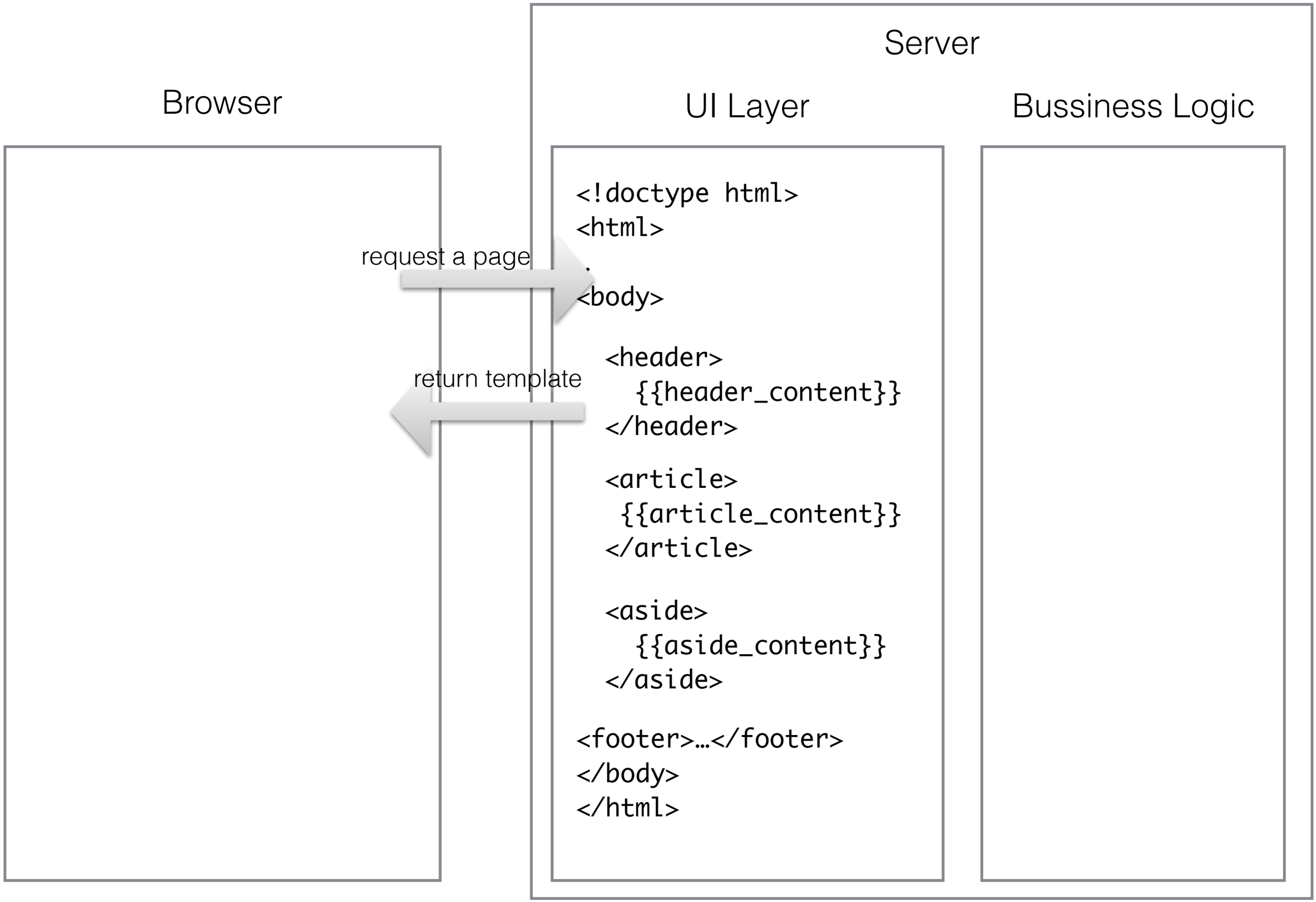

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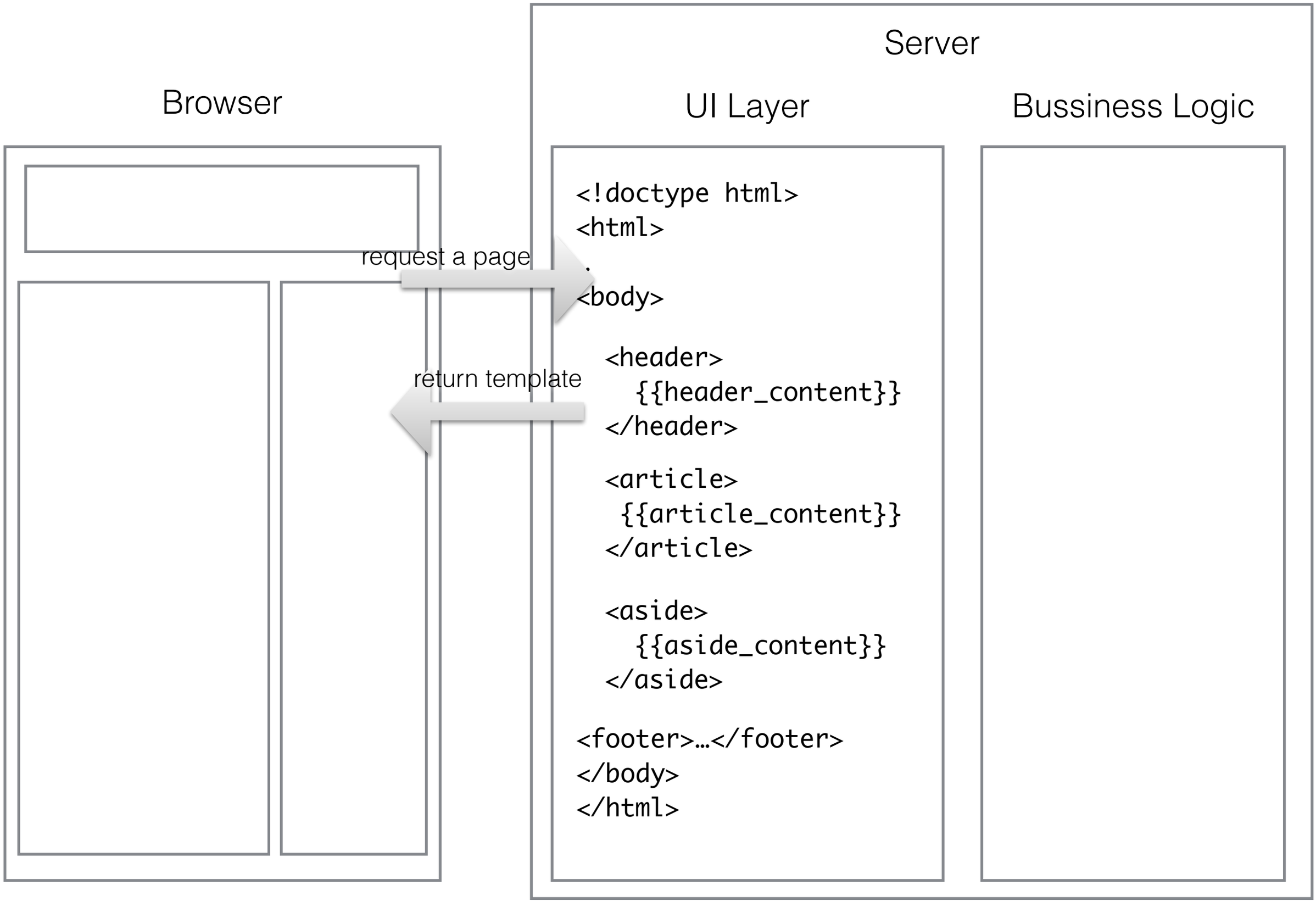

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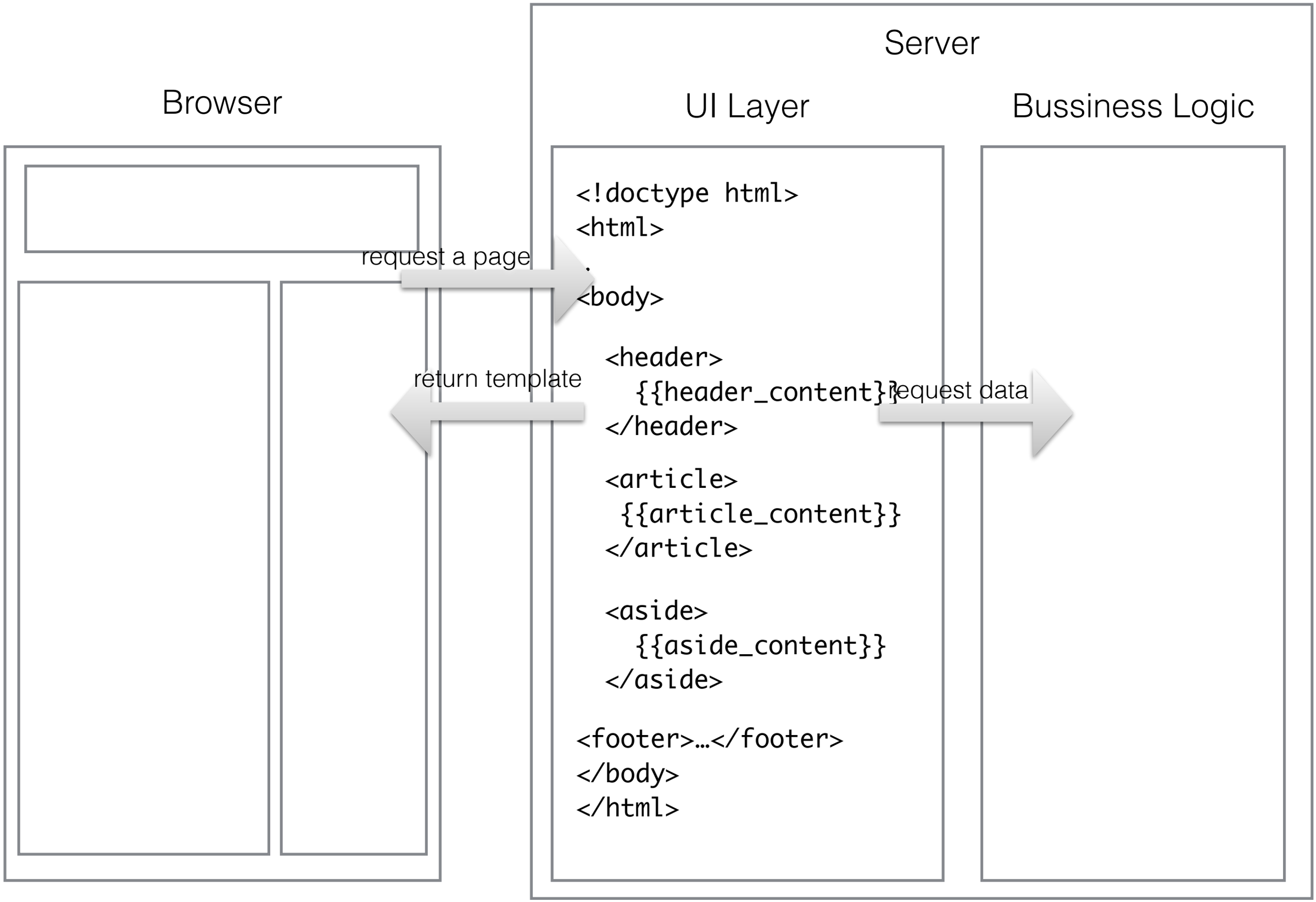

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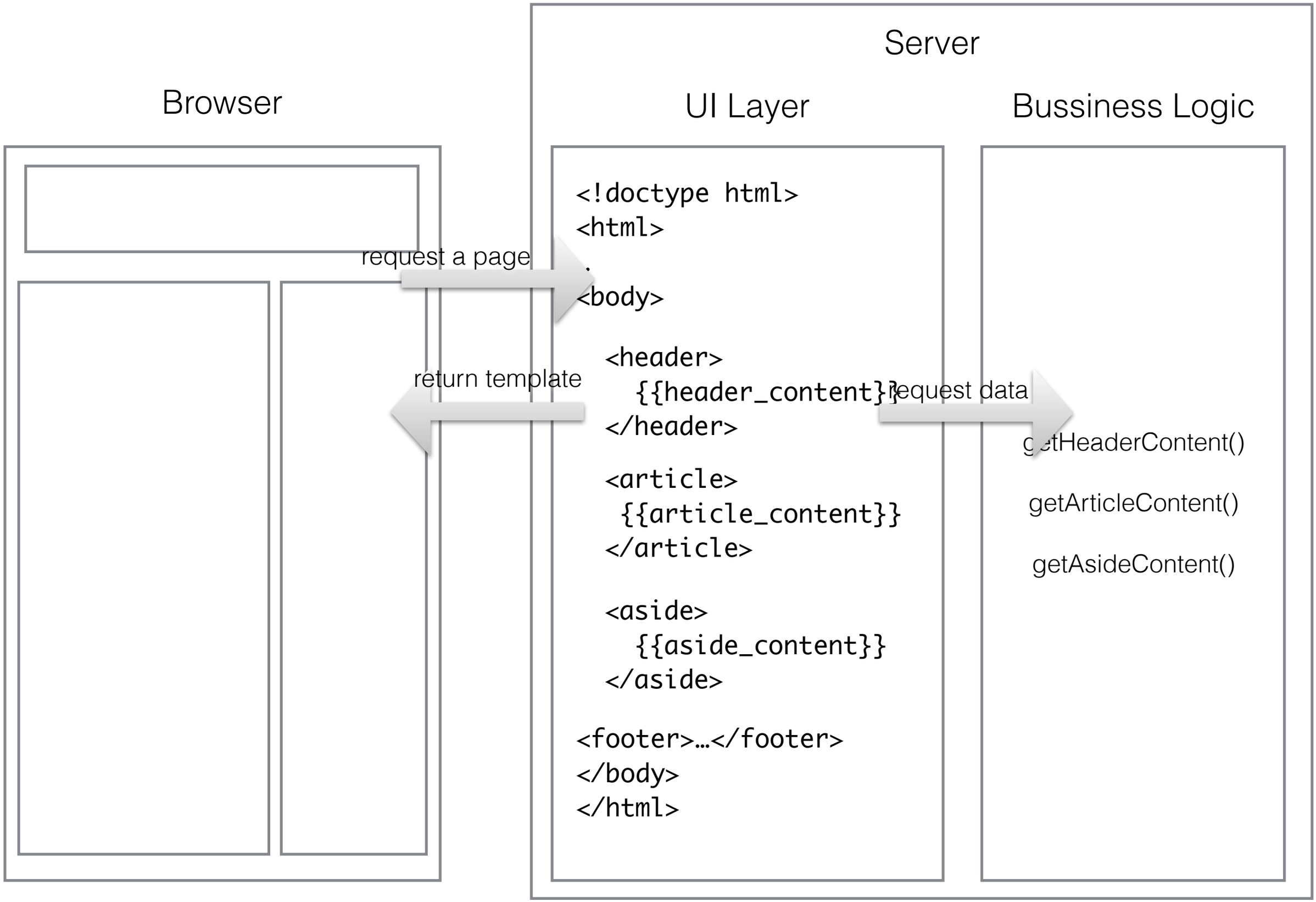

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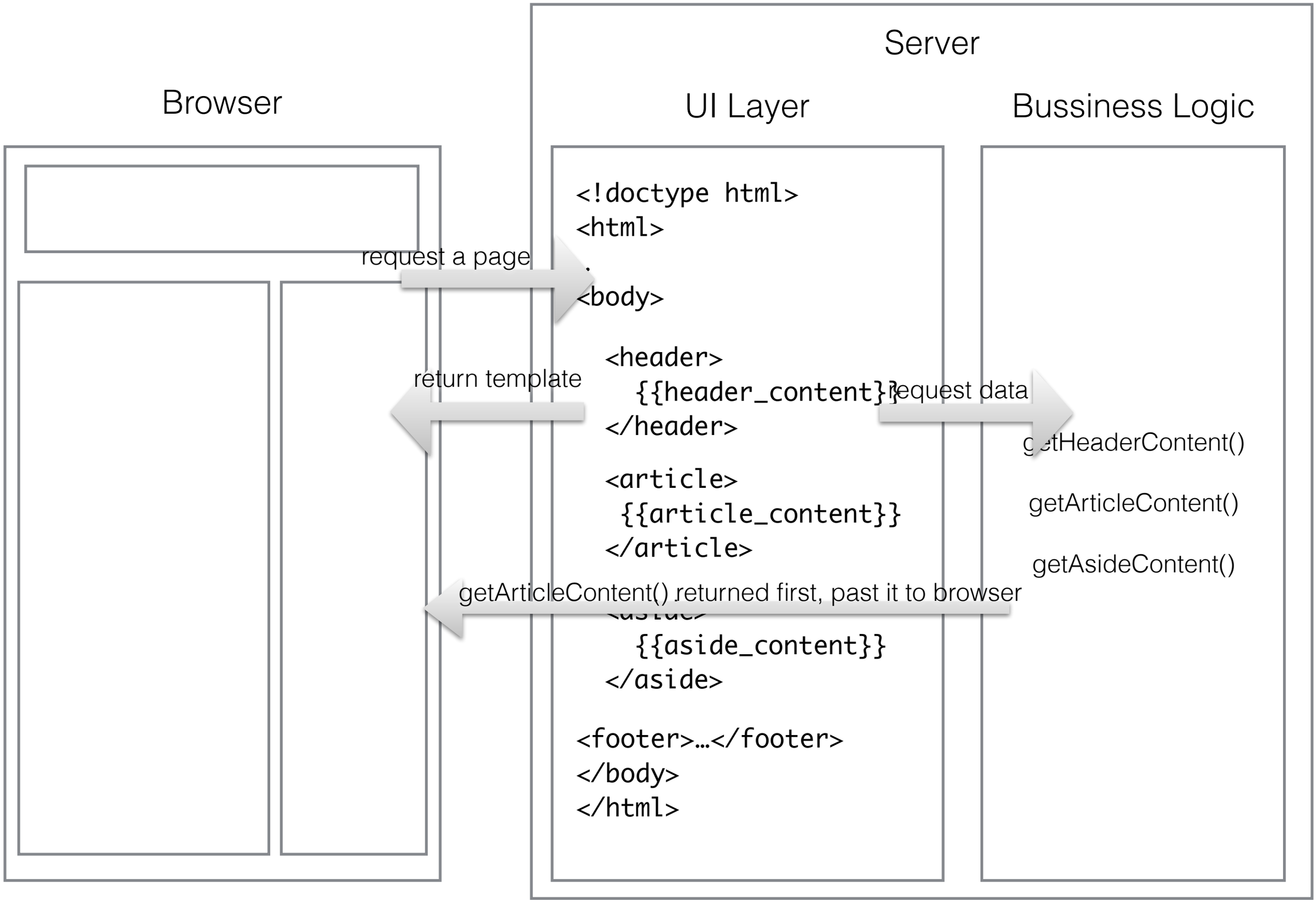

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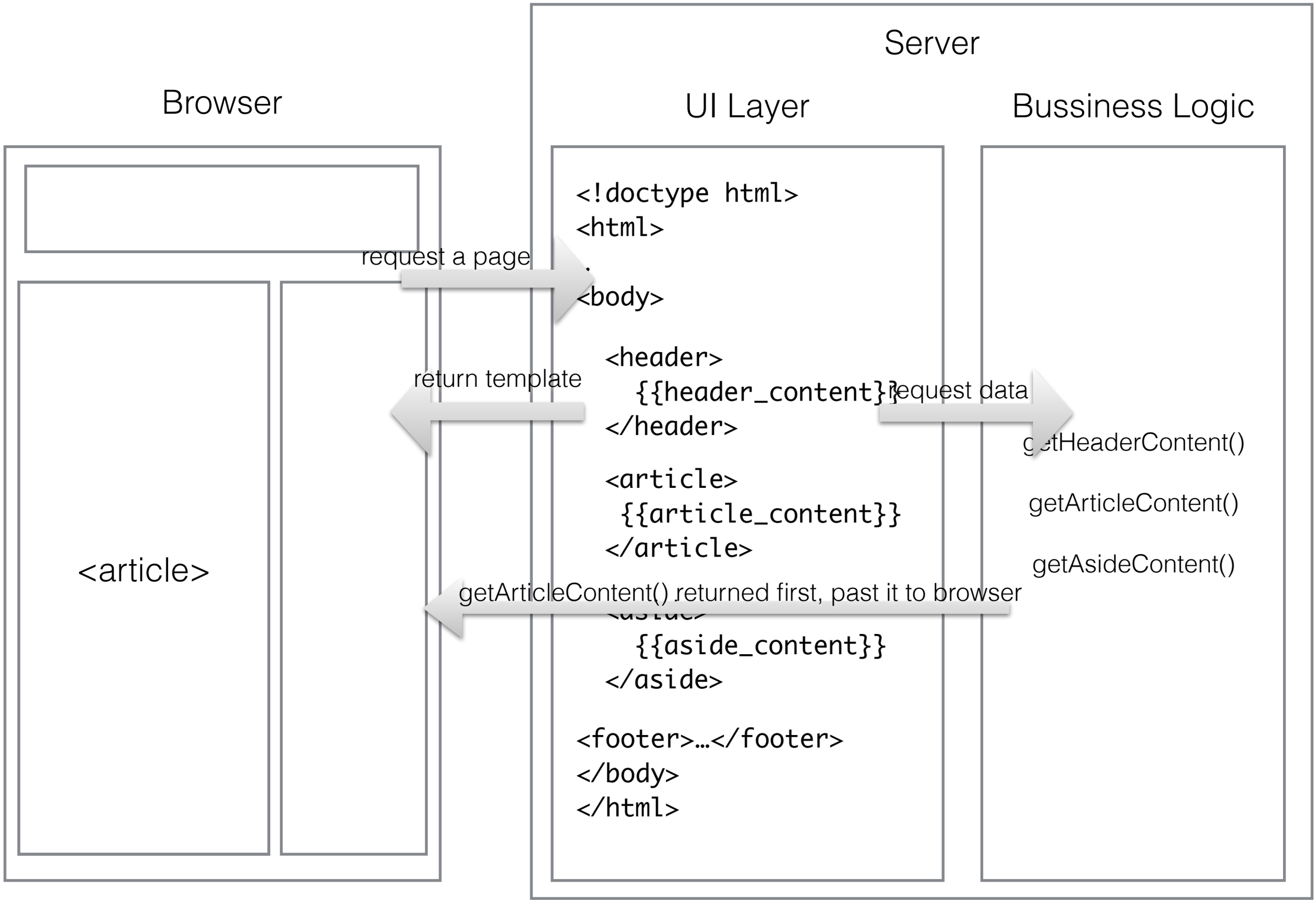

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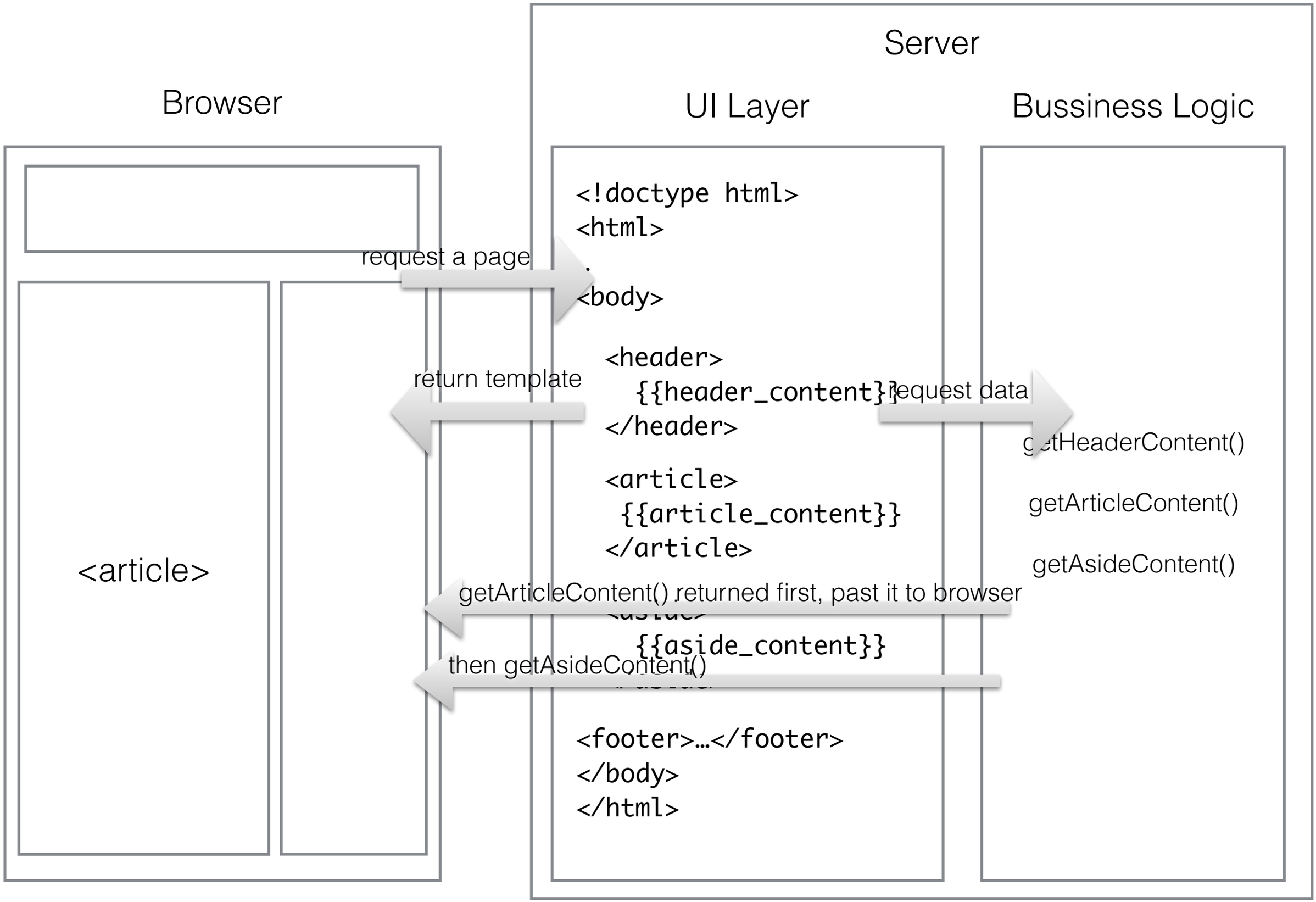

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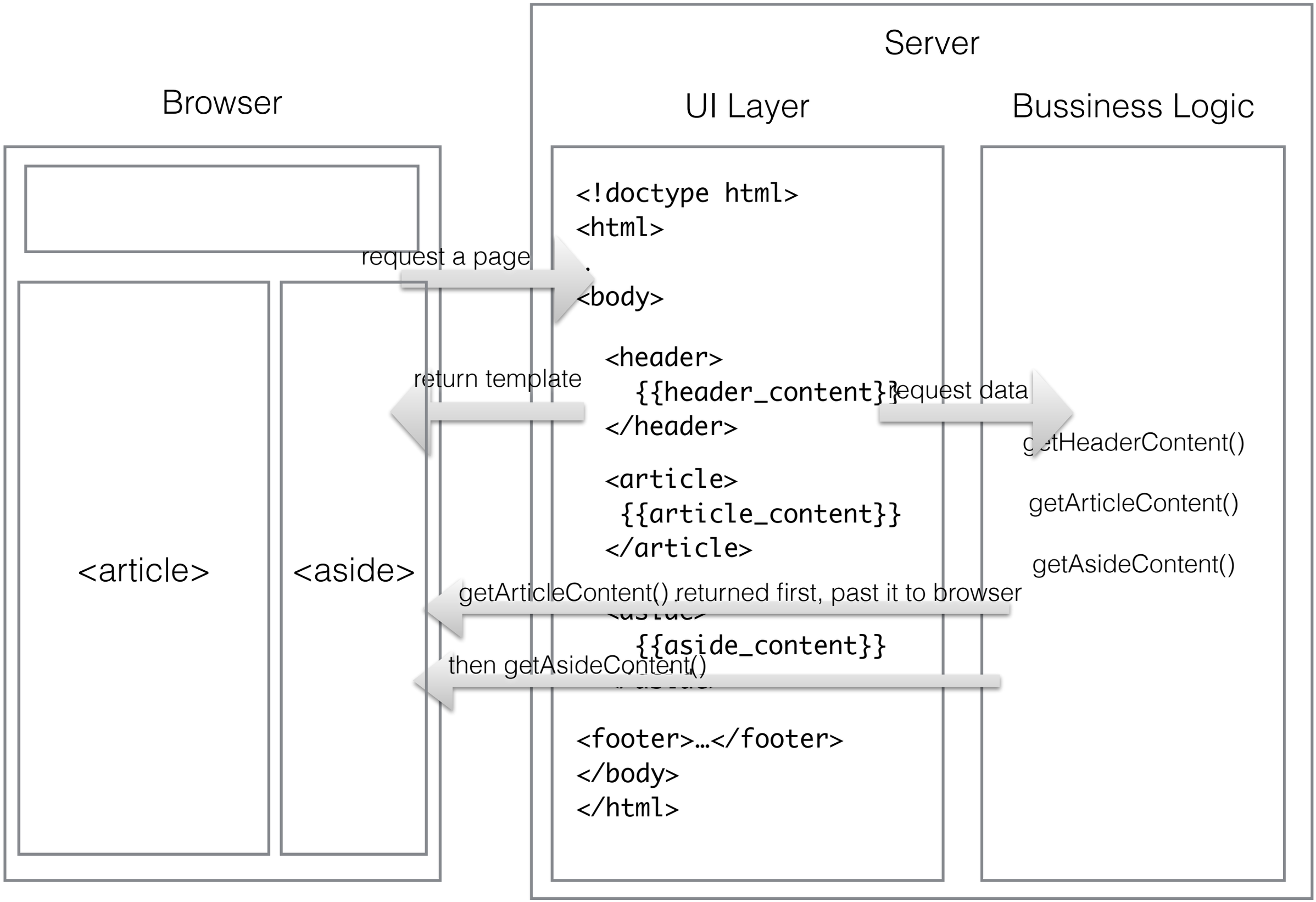

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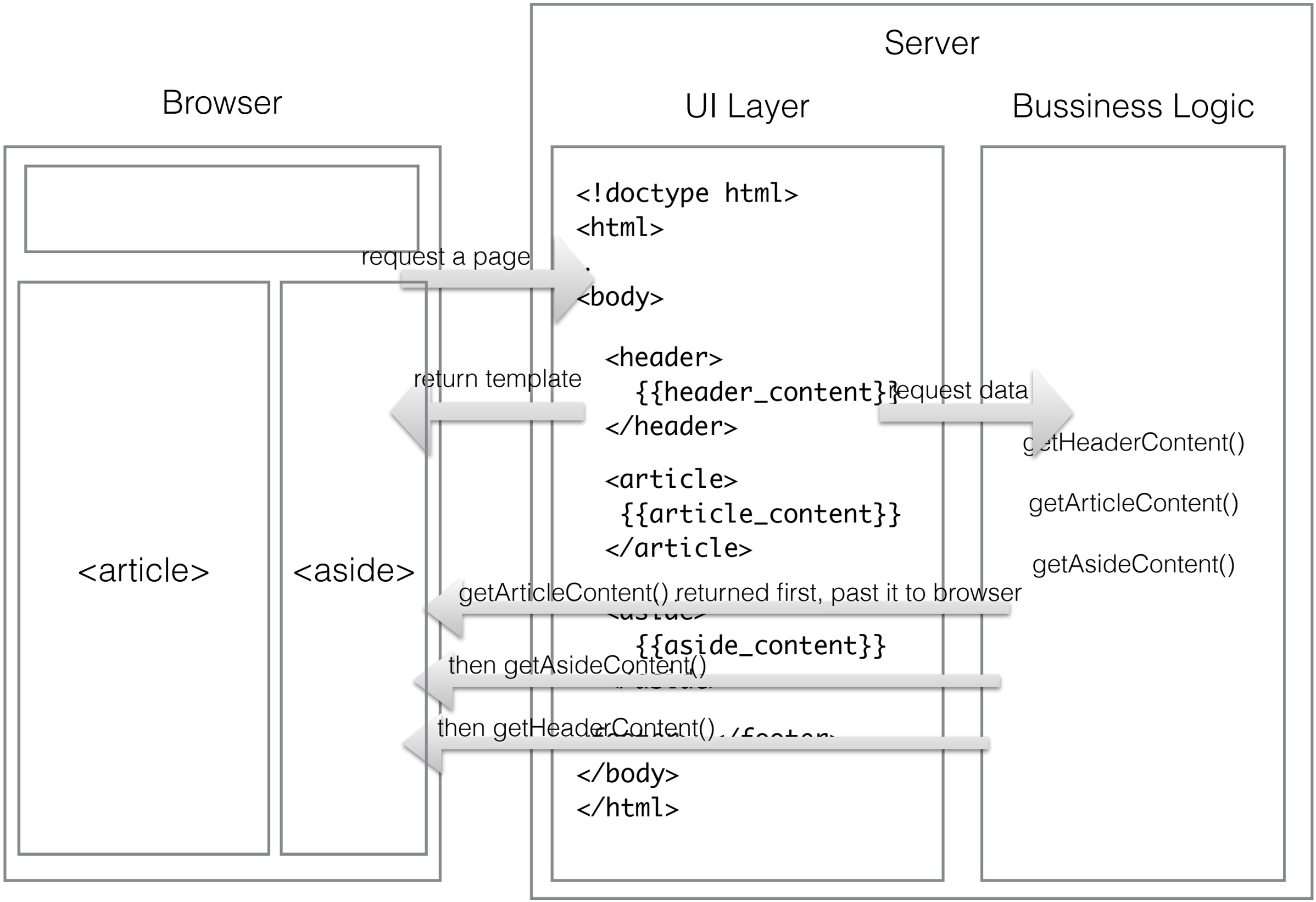

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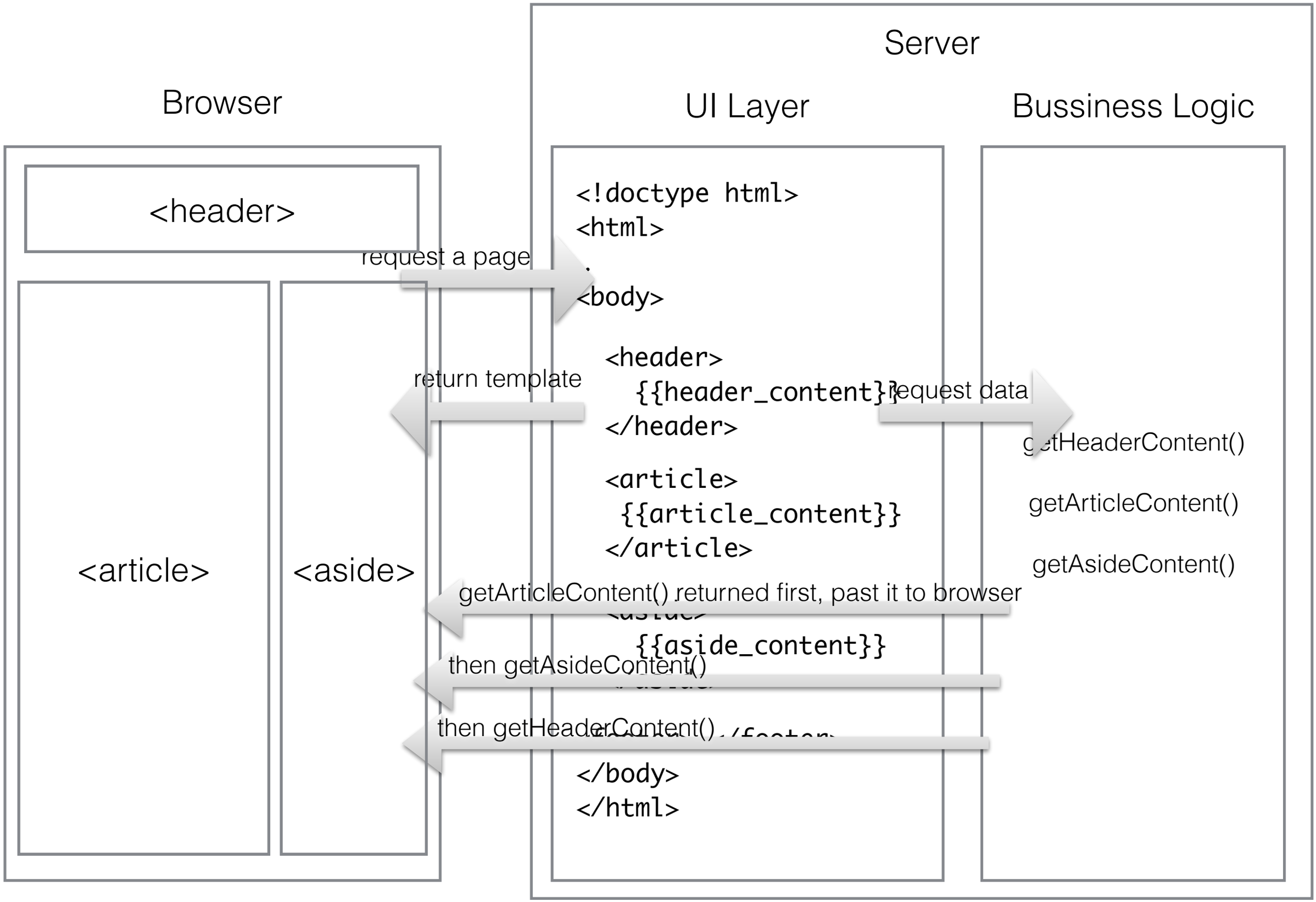

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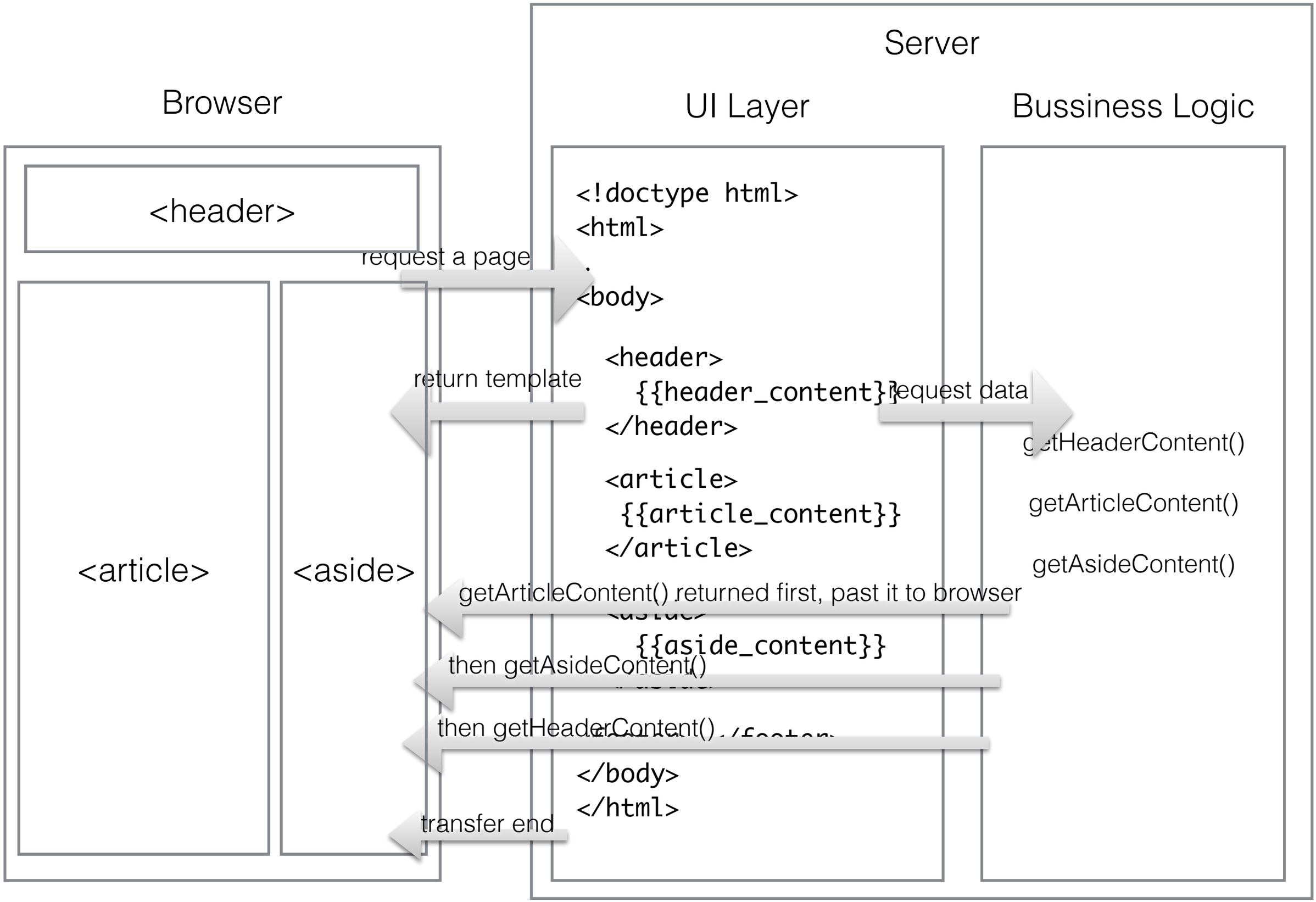

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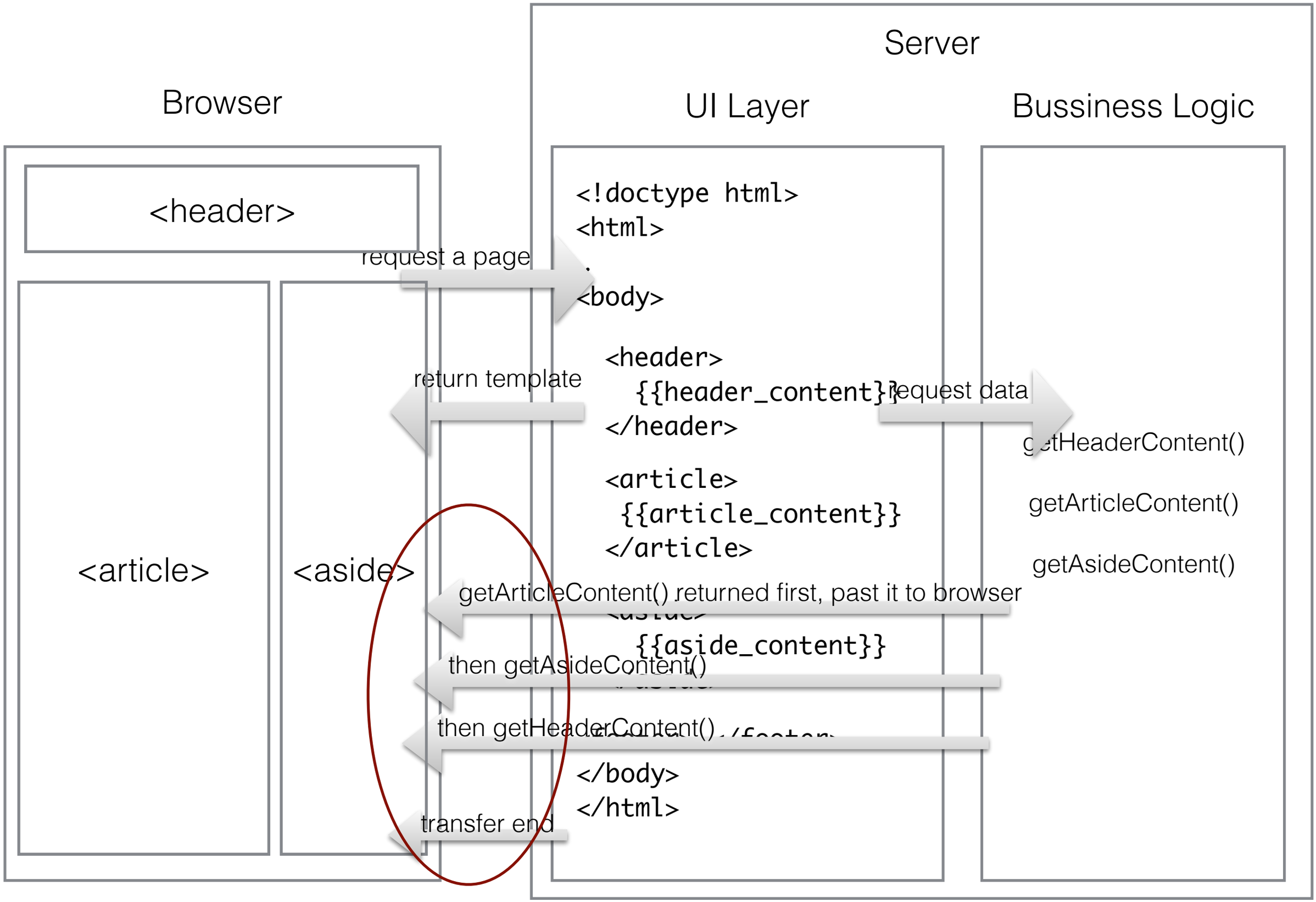

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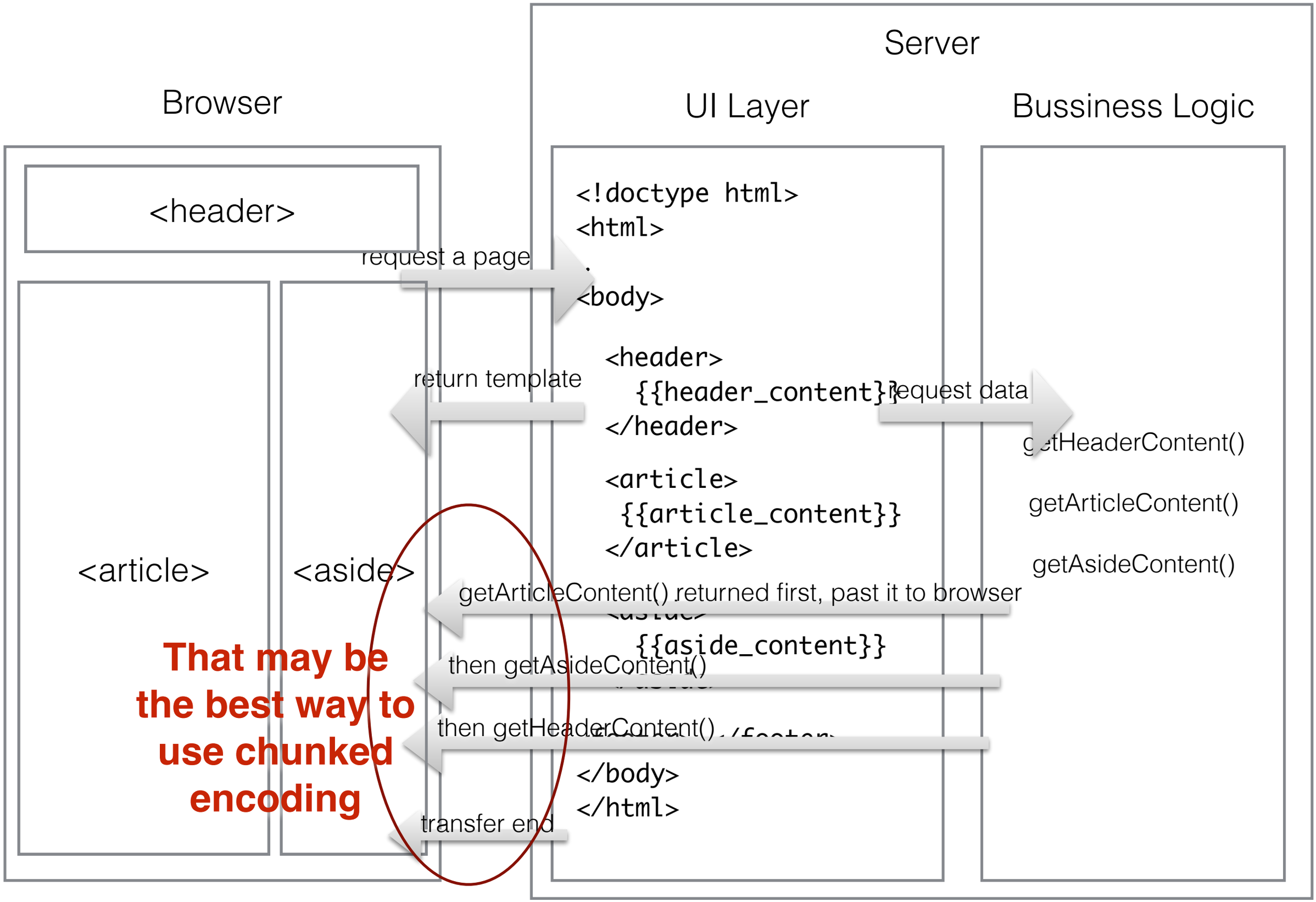


On “BigPipe on Node”

A “Simple” Demo - Sorry I couldn’t make it simpler

bigpipe.js (~/b

```
var http = require('http');
http.createServer(function (req, res) {
  res.setHeader('Content-Type', 'text/html');
  res.write('<style>header{width:300px;background:gray;}</style>');
  res.write('<style>article{width:200px;background:lightyellow;float:left;}</style>');
  res.write('<style>aside{width:100px;background:lightgreen;float:left;}</style>');
  res.write('<header></header><article></article><aside></aside>');
  res.write('<script>function insertHtml(tag, html){ document.getElementsByTagName('+
    'tag)[0].innerHTML = html;}</script>');
  var remain = 3;
  setTimeout(function () {
    res.write('<script>insertHtml("header", "&lt;header&gt;")</script>');
    sendEnd(--remain);
  }, 5000);
  setTimeout(function () {
    res.write('<script>insertHtml("article", "&lt;article&gt;")</script>');
    sendEnd(--remain);
  }, 1000);
  setTimeout(function () {
    res.write('<script>insertHtml("aside", "&lt;aside&gt;")</script>');
    sendEnd(--remain);
  }, 3000);
  function sendEnd(r) {
    if (r) return;
    else res.end();
  }
}).listen(1234);
```

More example: http://github.com/undoZen/bigpipe-on-node

Result

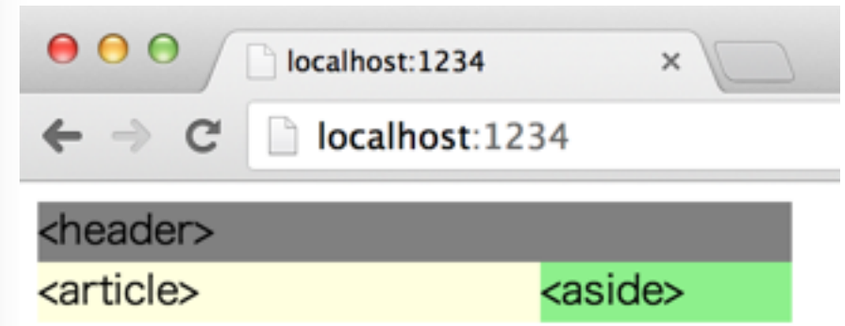
2. bash

```
Connected to localhost.
Escape character is '^]'.
GET / HTTP/1.1
Host: localhost

HTTP/1.1 200 OK
Content-Type: text/html
Date: Fri, 08 Nov 2013 16:46:36 GMT
Connection: keep-alive
Transfer-Encoding: chunked

33
<style>header{width:300px;background:gray;}</style>
46
<style>article{width:200px;background:lightyellow;float:left;}</style>
43
<style>aside{width:100px;background:lightgreen;float:left;}</style>
33
<header></header><article></article><aside></aside>
69
<script>function insertHtml(tag, html){ document.getElementsByTagName(tag)[0].in
nerHTML = html;}</script>
39
<script>insertHtml("article", "&lt;article&gt;")</script>
35
<script>insertHtml("aside", "&lt;aside&gt;")</script>
37
<script>insertHtml("header", "&lt;header&gt;")</script>
0

Connection closed by foreign host.
~ - @undozen
$
```



Why Node for BigPipe

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  - So templates could be (re)used on both server-side and browser-side
    - So you can fallback to Content-Length way
- It response HTTP request using chunked encoding <u>by default</u>

On Node

Why Node for Us
(as front-end developers)

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- HTML generation should be front-end developers' consideration
  (while back-end developers are focusing on data)

Why Node for Us (as front-end developers)

- HTML generation should be front-end developers' consideration
  (while back-end developers are focusing on data)

- for me, it's the most natural way to co-operate with back-end developer

In Traditional Company…

Front-end Team

Browser

<header>

<article>

<aside>

Back-end Team

Server (Python/Ruby/Java)

UI Layer

```
<!doctype html>
<html>
…
<body>

  <header>
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  </header>

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  </article>

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  </aside>

<footer>…</footer>
</body>
</html>
```

Bussiness Logic

getHeaderContent()

getArticleContent()

getAsideContent()

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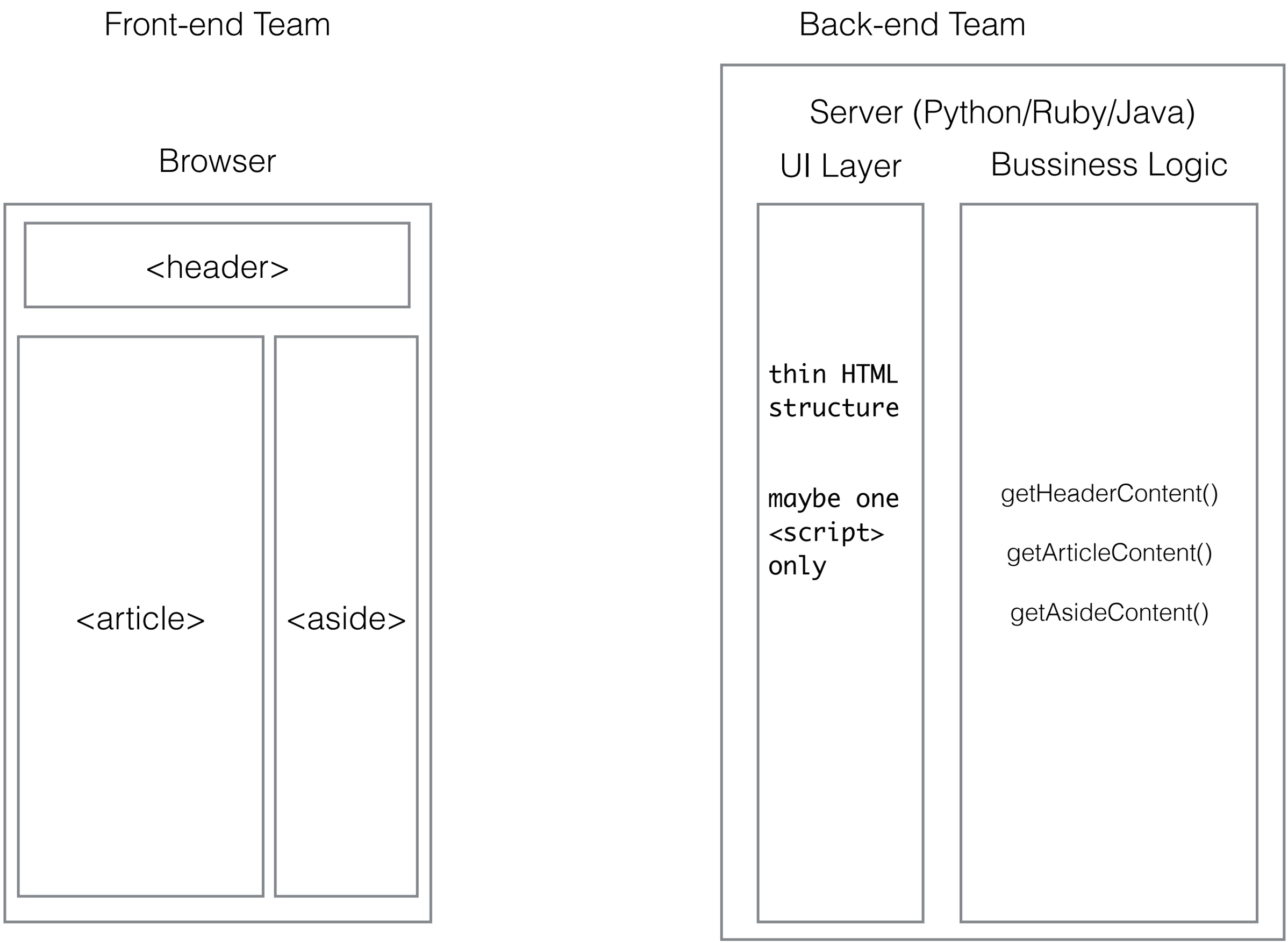
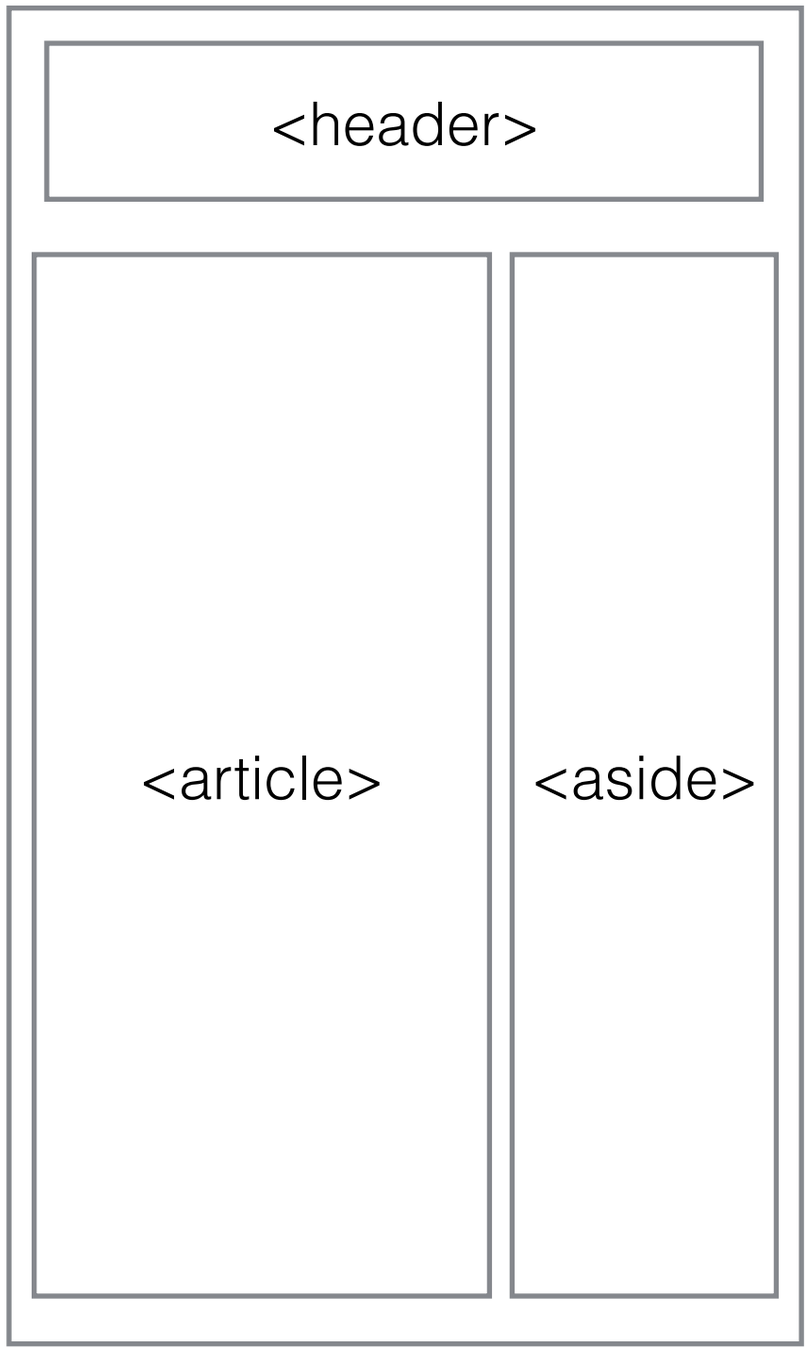
In Heavy Web App Team…



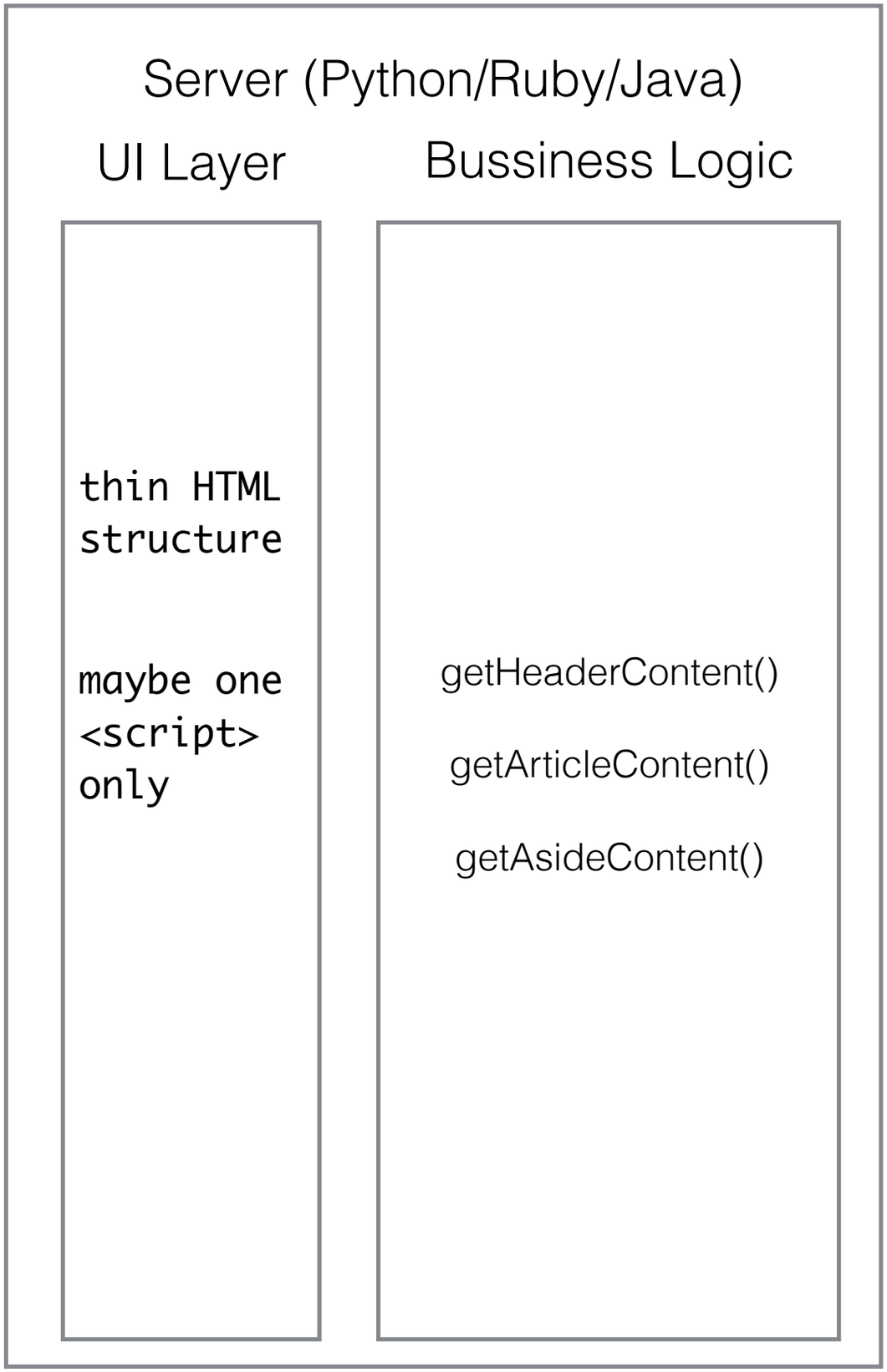
In Heavy Web App Team…

Front-end Team

Browser



Back-end Team



In Company Using Node.js…

Front-end Team

Back-end Team

Node.js

Browser

UI Server

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In Some Awesome（牛逼） or Awful（苦逼） Company…

Full-Stack Team

Whatever ┐(´ ∇ `)┌

Browser

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What I perfer more…

Front-end Team

Back-end Team

Node.js

Browser

UI Server

Data Server

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getHeaderContent()

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Referring

- The Original Facebook Article About BigPipe
  www.facebook.com/note.php?note_id=389414033919

- My Chinese Article
  https://github.com/undoZen/bigpipe-on-node

- Another Chinese Article
  www.searchtb.com/2011/04/an-introduction-to-bigpipe.html

- N. C. Zakas on Node.js
  www.nczonline.net/blog/2013/10/07/node-js-and-the-new-web-front-end/

Thank You!

You Can Find Me on the Internet

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